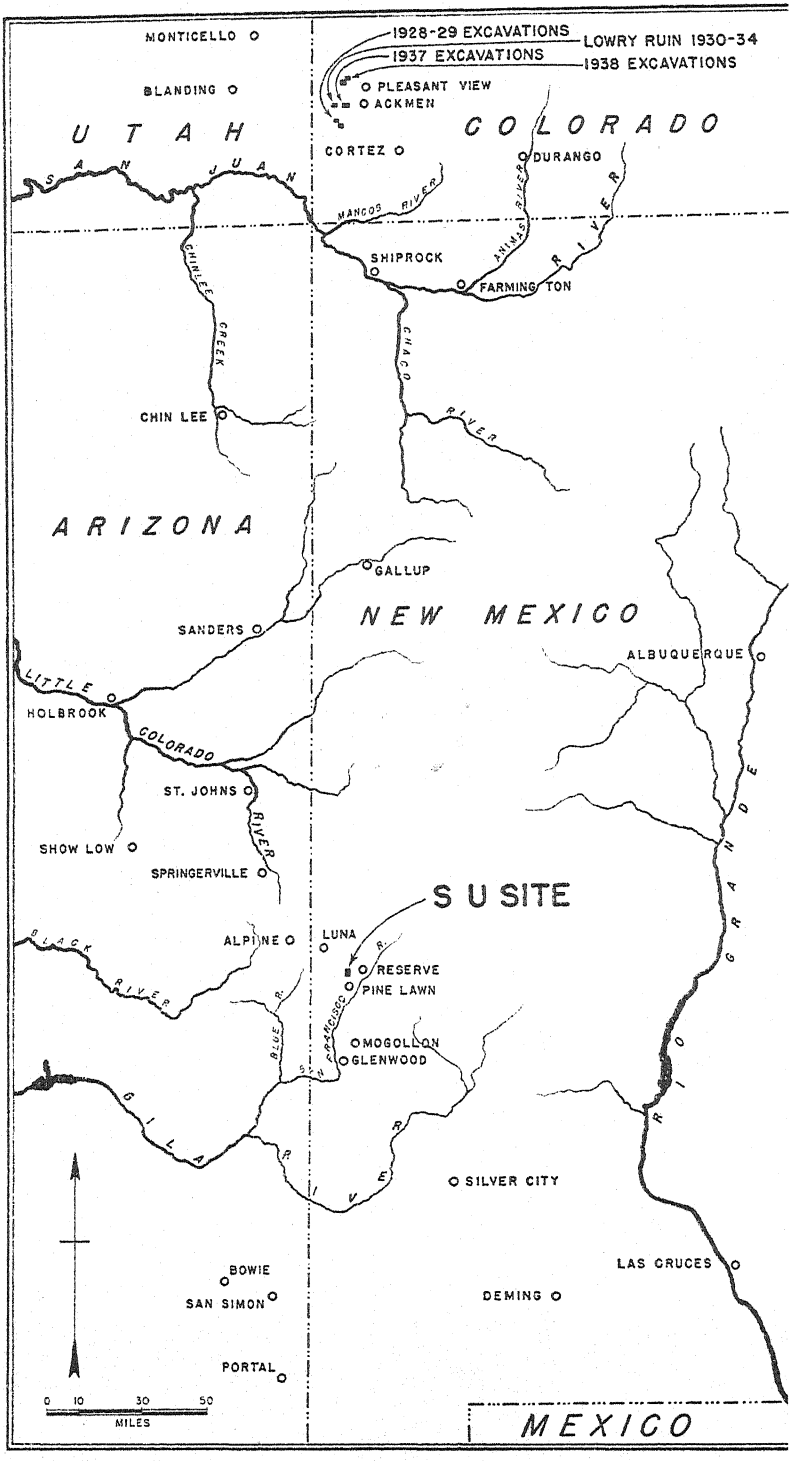

MAP 12. MAP SHOWING LOCATION OF SU SITE, NEW MEXICO

THE SU SITE

EXCAVATIONS AT A MOGOLLON VILLAGE

WESTERN NEW MEXICO

SECOND SEASON
1941

BY

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[1] Letters refer to types of specimens that are described in text and not to individual specimens; for example, in Figure 67, pestles in "a" section are designated as type "a" on facing page (angular pestles).

MAPS

PREFACE

After a lapse of one season, I again conducted the Field Museum Archaeological Expedition to western New Mexico in order to continue digging at the SU site.[1] This Mogollon village is located in the New Mexico portion of the Apache National Forest, Township 7 S., Range 20 W., N.M.P.M., Catron County (Map 12). The nearest town is Reserve (New Mexico), about seven miles eastward.

Excavations in the Apache National Forest were carried on under a permit issued to Field Museum by the Forest Service, United States Department of Agriculture. From Mr. R. B. Ewing, Forest Supervisor (office at Springerville, Arizona), Apache National Forest, and Mr. Robert I. Stewart, Assistant Forest Supervisor, we received hospitality, co-operation, and friendly assistance whenever needed. I am grateful to them for all their favors. To Mr. Benton S. Rogers, District Forest Ranger of the Hood Ranger Station, Apache National Forest, I wish also to express my thanks for his friendship, help, and hospitality.

The object of the expedition was to continue excavations in a rare type of site, the extent of which could only be guessed at. I call the SU site "rare" because, so far as I now know, it is the largest site of its kind in the vicinity. It has thus far been a one-phase site (barring the late reoccupation of one house) and has yielded only plain pottery (as described herein) and characteristic, crudely chipped stone implements and other minor artifacts. Since the types of artifacts we are dealing with are new and practically unknown, and since the earliest stages of the Mogollon culture had not been previously investigated, I felt (in 1939) it would be unwise to generalize about house types or associated artifacts and pottery until much more extensive investigation had been carried out. In 1939, we excavated eight houses and recovered about 12,000 sherds and 300 stone and bone tools; but this is nothing when one is working with something as little known as is this new cultural entity, called Mogollon. In 1941, we cleaned out eight more houses and recovered approximately 18,000 sherds and 750 stone and bone tools.

Thus, we have added a mite to that which is known about an earlier phase of Mogollon. We may now more safely make a few generalizations and conjectures about the Mogollon culture and its relationship to other Southwestern cultures, both earlier and later.

[1] The name for the site was adopted from the nearby SU Canyon. "SU" is also the name of a neighboring ranch and is used as a brand mark.

I owe Mr. Stanley Field and Colonel Clifford C. Gregg, respectively President and Director of Field Museum, and the Board of Trustees thanks for a continuing interest in and appreciation of my field research. With such backing, the expedition was bound to prosper—as indeed it did.

The work of the expedition could not have been so felicitously concluded had I not been assisted by an able staff. It is with great pleasure that I publicly thank the members of this camp staff for their co-operation and assistance, and acknowledge my indebtedness to each of them.

My assistant, Robert J. Braidwood, of the Oriental Institute, and Instructor in the Department of Anthropology, University of Chicago, was competent, observant, meticulous, good-natured, and punctual. He was also skillful in handling the crew of diggers. Credit is likewise due him for the perspective sketch of Pit House J shown in Figure 43.

Robert Yule, Assistant in the Department of Anthropology at Field Museum, was photographer and cartographer. An Eastman 5 x 7 view camera was used, and the pit house pictures were taken from a twenty-foot tower. All negatives were developed in the camp dark-room.

Brigham A. Arnold, graduate student in Anthropology, University of Arizona, initiated an archaeological survey of the territory near the SU site. The two square miles traversed by Mr. Arnold in this survey yielded sixty-six sites. A report by him is included herein.

Mrs. Stanley Dickson, who has been our cook for several past seasons, was again in charge of the food department. Her unfailing good humor at all times and her willingness to make the best of any situation gave camp life a cheerful and healthy tone.

Miss Jane Darrow and Miss Margaret Ross, volunteers who paid their own expenses, were entrusted with several tasks for which they received training at this Museum. Miss Darrow washed and catalogued sherds, and stone and bone implements; Miss Ross cleaned and treated all skeletal material and helped with sundry household duties.

The last part of the season Miss Marjorie Kelly helped count sherds and catalogue artifacts. Later, she analyzed our skeletal material, a report on which is included herein.

Our residence in the Apache National Forest would have been much more difficult and less pleasant had it not been for Mrs. Mary

Crackel, proprietress of Pine Lawn Tourist Camp, her son Daniel, and her daughter Elizabeth Jane. In true neighborly fashion, and often at inconvenience to herself, Mrs. Crackel accommodated us in many thoughtful ways, such as furnishing camp with water, telephone service, and dairy products. Mr. Daniel Crackel assisted with the excavations and, with his sister, looks after our camp during the winter. I am grateful to all of them for their help.

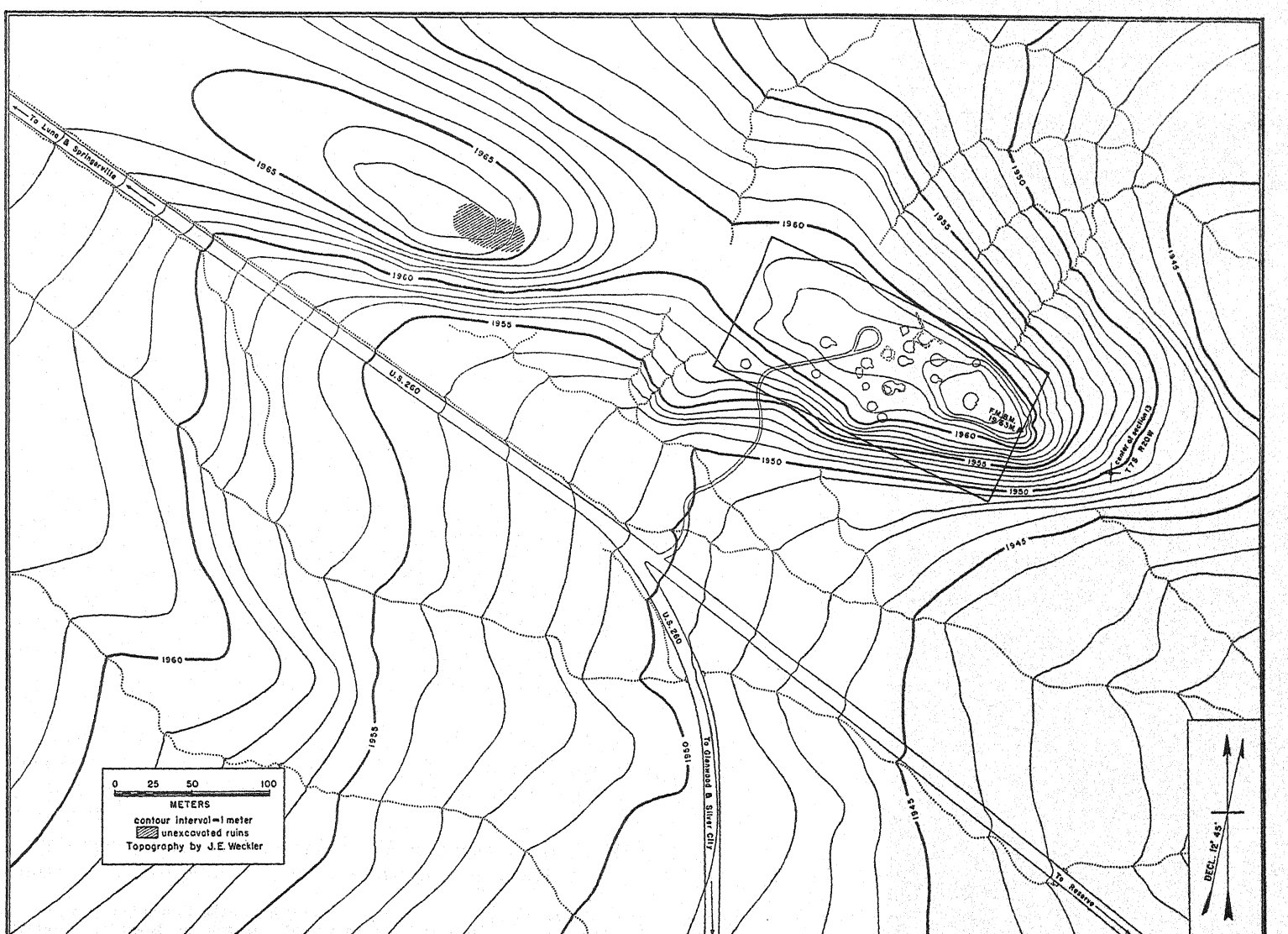
To the men who dug faithfully, well, and without stint, I wish to express my thanks: Jose Armijo, Rafael Armijo, Juan Baca, Clifton Kroeber, Luis Martinez, Charles Mather, Eduardo Naranjo, Francisco Naranjo, Charles DiPeso, Pablo Serna, Jules Williams.

For technological aid in studying the SU pottery I turned to Dr. Frederick R. Matson, Assistant Curator of Ceramics, University Museums, University of Michigan, and to Miss Florence Connolly, of the University of Arizona. I am grateful to these friends for their great help. Their findings are included in the section on Pottery.

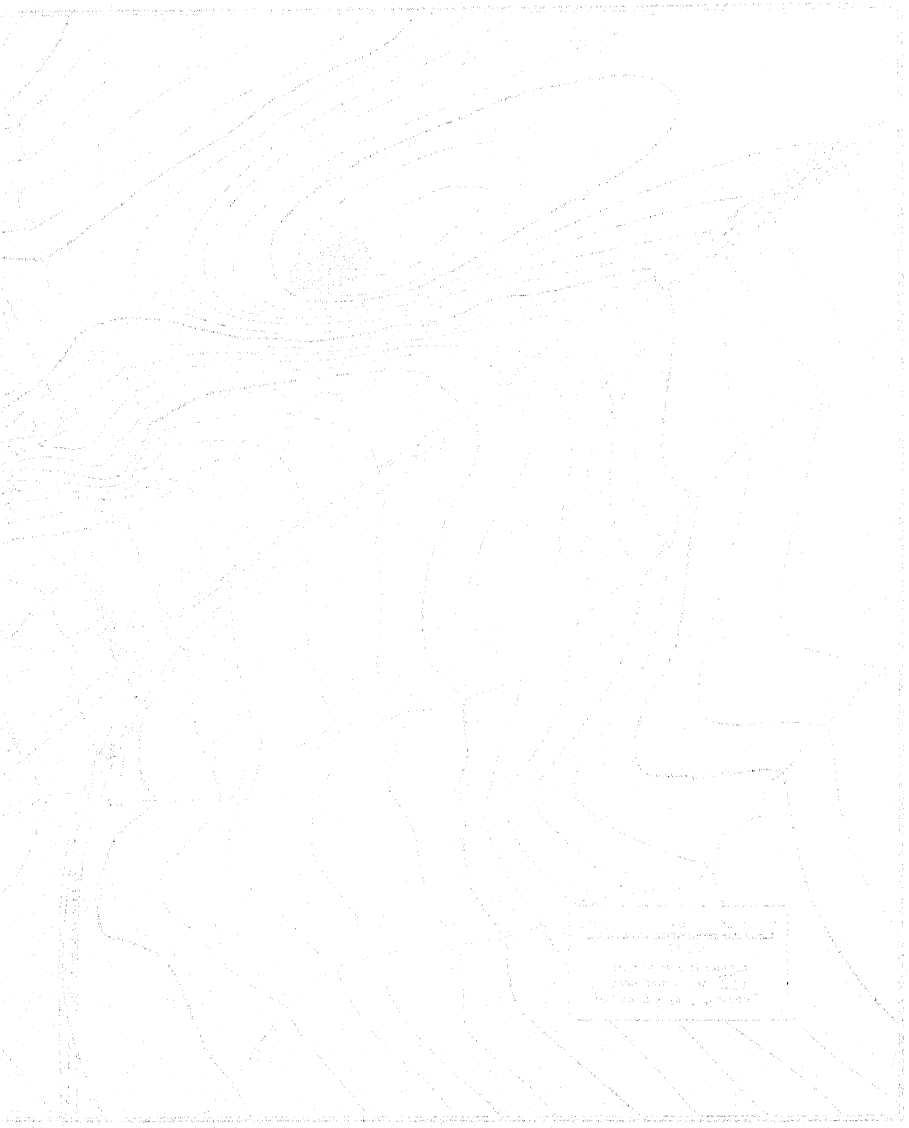
Dr. W. S. Stallings, Jr., Research Director, Taylor Museum of the Colorado Springs Fine Arts Center, with advice and help from Mr. E. T. Hall, Jr., undertook to analyze the tree-ring specimens from the SU site. However, due to the war, this analysis has had to be postponed.

Mr. Don Lehmer, of the University of Chicago, devised the chart shown in Figure 91. He also read Chapter II and made several suggestions.

PAUL S. MARTIN



MAP 13. TOPOGRAPHIC MAP OF SU SITE, NEW MEXICO



THE SU SITE

I. INTRODUCTION

In 1939, when Field Museum first undertook archaeological work at the SU site, the status of the Mogollon culture was problematical. At that time, many archaeologists felt that the Mogollon culture was a peripheral variant of the Anasazi (Basket Maker–Pueblo) or was a combination of peripheral Anasazi and Hohokam. Very few thought of the Mogollon culture as a separate, taxonomic entity with the same independent status which time and weight of opinion granted to the Anasazi (Basket Maker–Pueblo) and the Hohokam cultures.

In 1939, we desired to locate and excavate a site which, judging by surface indications, would yield only plain, undecorated (and therefore early?) pottery and early types of stone implements. We felt that such a site would probably represent a single short period or phase and would therefore help to clarify the existing Mogollon situation as set forth by Gladwin, Haury, and Nesbitt (see Bibliography). We also hoped that such a site would be pre-Georgetown[1] and fairly early because priority of the Mogollon culture to the Basket Maker would settle the argument of the independent status of Mogollon. With the help of the staff of Gila Pueblo and Dr. Emil W. Haury, Chairman of the Department of Anthropology at the University of Arizona, such a site was located in the Apache National Forest and was named SU (see Preface for exact location; Map 12).

Excavations at the SU site were carried on in 1939. Eight houses were dug, and about 12,000 sherds of plain, undecorated pottery and about 400 stone, bone, and shell artifacts were recovered and analyzed.

However, valid generalizations about such a comparatively new idea as the Mogollon culture, whether it is considered an Anasazi

[1] The sequence of Mogollon phases is presented in the following table. This sequence is based on stratigraphy, tree-ring dates, cross-dating, and typology. Dates are only approximate.

	A.D.
Three Circle	900–1100
San Francisco	700–900
(Some Anasazi traits found both in Three Circle and San Francisco phases, but these are predominantly Mogollon)	
Georgetown	?–700

variant or an independent entity, must be based on an impeccably large mass of data. The array of raw data must be large enough to cancel out most errors in judgment and to convince the most skeptical.

Certainly the information accumulated from the 1939 dig was not enough to fit these requirements. Likewise, more tree-ring materials were essential, as the few fragments collected in 1939 did not provide the dendrochronologists with a solid sequence for dating. The 1939 beams yielded no dates.

Much more work was done in 1941 and more artifacts acquired,[1] but the SU site is still not exhausted. Even on the basis of the total sum of information from this site, it is difficult to make valid generalizations, although conjectures will be made in this report.

However, more excavations must be carried on at the SU and in other nearby sites of the same period. When, finally, we have perhaps 75 or 100 houses described and photographed and when we have accumulated perhaps 75,000 sherds and many thousands of stone and bone implements, we can compound a few generalizations that will stand rigid scrutiny.

Now that more raw data have been assembled, it will be possible to make a few conjectures concerning the origin, growth, and development of the Mogollon culture and its relation to earlier and later cultures. Certainly we can better delineate one earlier aspect of it and can set forth the characteristic or predominating traits of this early period—the Pine Lawn phase.

It was also hoped that we might, by careful scrutiny of all our materials and information, shed some light on how the SU Indians lived, how they grouped themselves socially, how they solved their economic and food problems, why they lived in a town, and whether they had developed any religious concepts.

A portion of the summer was devoted to an archaeological survey, the results of which are published in this report. More work of this nature is planned, as we feel it is an important adjunct to our digging.

These were a few of the problems and goals of this expedition. Some of the desiderata were secured; others were not. Another season at the SU site is necessary and will be undertaken as soon as it is possible.

[1] Ten houses, about 19,000 sherds, and about 800 stone, bone, and shell artifacts.

II. SYNTHESIS[1]

SUMMARY

LOCATION

The excavation of the SU site, first investigated in 1939, was continued in 1941. This site is located in the Apache National Forest, Township 7 S., Range 20 W., N.M.P.M., Catron County, New Mexico (Map 12). The elevation of the SU site is 6,440 feet above sea level. The forest is composed of yellow pine, pinyon, juniper, and live oak. The average annual rainfall (as recorded at the Hood Ranger Station, Catron County, New Mexico) for the period (1917–40) is 14.02 inches.

HOUSES

The number of houses excavated in 1941 was ten; in 1939, eight. Thus eighteen houses (fifteen pit houses and three surface houses) have been studied at the SU site. All of these, as far as one can tell from typological evidence, fall in the Pine Lawn phase (see p. 120). In addition, one house excavated in 1939 was reoccupied in the Three Circle phase. The summary here given includes all houses excavated.

The houses are difficult to characterize briefly because each differs from the others. Roughly, however, it may be stated that they are extremely irregular in shape, being neither round, square, nor rectangular, and the greatest diameters vary from 4 to 9 meters. The pit house floors vary in depth from 25 cm. to 1 meter. The surface houses were also irregular in shape and size, were provided with wattle-and-daub walls, and varied in depth from 0 to 36 cm. (depending on the slope of the ridge). All but one house contained at least one pit; most houses contained several of varying depths. The number of principal roof supports varied in number from one (centrally located) (although House L had none) to eight or ten or even to forty-nine in the case of Surface House 3.

All but six of the pit houses were provided with side entrances. No firepits which could be identified with certainty were located. In 1939, several centrally placed, shallow pits containing a trace of ashes were noted. In 1941, no firepit—that is, a pit yielding definite signs of heat (such as reddening or darkening of soil in and around pit) or containing ashes—was found.

[1] The data on which this chapter is based are given in detail in Chapters III–VIII.

The lack of a typical house form suggests to me that this trait—house-building—had not become stabilized or crystallized. To express it differently, the house had not developed into an art form. And this suggests further that this trait—houses—had not been a part of the SU culture long enough to have become stabilized and formalized into one or two typical patterns of house-building. These people were experimenting and fumbling with a new idea. We know that in later periods (e.g., A.D. 900) the late Mogollon house form became standardized; and in digging such houses (built after A.D. 900) one can expect to find certain regular features in and about each house. Rarely is one disappointed.

POTTERY

During the season of 1941, 19,644 sherds were recovered from the SU site. Only three types of pottery were found: Alma Plain, Alma Rough, and San Francisco Red. Further discussion of these types appears below. The sherds from each level of each pit house were washed, classified, and twice counted by levels. Since no significant variations or differences appeared from statistical treatment of the sherds by levels, the totals of all sherds from all levels were grouped together and called "sherds from fill" (see tables, p. 247). All floor sherds ("floor" being defined as the floor of the house and the first 10 cm. of fill above the floor) were segregated from "fill sherds."

Several observations may be based on the data thus accumulated and studied.

The proportionate amounts of the three pottery types (Alma Plain, Alma Rough, and San Francisco Red) from within the houses (floor and fill) is practically the same as from the stripped zones without the houses.

Furthermore, the distribution (in percentages) of pottery types (of totals for the entire site) is almost the same as those from the 1939 dig (Martin, 1940, p. 84).

It should be noted, however, that there are fluctuations when the frequencies of wares from one house are compared with those from others. But the range of variations is about the same for both seasons. These variations seem to indicate only that pottery was a comparatively new trait at the SU site—so new that no particular type had yet been singled out as the predominant favorite. For example, at two Basket Maker sites that I excavated in Colorado (Martin, 1939, p. 455) I found that Lino Gray was seven or eight

times as frequent as any other pottery type. It represented between 75 and 85 per cent of all pottery types. Moreover, the floor frequency never dropped below 72 per cent or rose above 89 per cent.

At the SU site, Alma Plain generally leads in floor frequency (although not always, as witness Houses A, I, J, 3) and its fluctuations (floor count only) range from 10 per cent to 76 per cent. This is certainly not as constant as the Lino Gray frequency referred to above; and, although Alma Plain is generally the most frequent floor type, its lead is small. For both seasons, it represents about 50 per cent of the total sherds, which is only twice as much as either of the other two types.

In other words, Alma Plain was the generally preferred pottery, but it was not the big leading favorite as was Lino Gray from the Basket Maker sites mentioned above.

As stated above, only three pottery types were found. All of these are plain, undecorated wares.

Alma Plain is a type already well known. It has been described by Haury (1936b, p. 32) and referred to in the previous SU report (Martin, 1940, p. 80) and again in this report in the chapter on pottery.

Alma Rough is the name assigned to the pottery which I have previously called "Unpolished Brown" (Martin, 1940, p. 78). This name of Alma Rough was chosen because the color of Alma Rough is similar to that of Alma Plain and because Alma Rough seems to be a kind of alter ego for Alma Plain. Furthermore, the style of the name fits in with the style used for the whole series of Mogollon, unslipped, unpainted wares—Alma Plain, Alma Neck-Banded, Alma Scored, Alma Punched, Alma Incised. Briefly, Alma Rough is unpolished; it is tempered with coarser materials and is provided with thicker walls than is Alma Plain. From firing experiments made on raw clay samples brought in from the SU site and on sherds, by Dr. F. R. Matson, Assistant Curator of Ceramics, University Museums, University of Michigan, it is possible to state that Alma Rough was probably made from the same clay as was Alma Plain (Alma is a hamlet near the Mogollon Mountains in New Mexico). (See Martin, 1940, Fig. 35, upper left, for illustration of Alma Rough.)

San Francisco Red, Saliz variety, is the name assigned to the pottery I formerly called "Polished Red" (Martin, 1940, p. 78). This red pottery is similar in most important respects to the classic San Francisco Red, as described by Haury (1936b, p. 28); but, in order to make it clear that we are not claiming identity between

our Polished Red and the classic San Francisco Red, and yet to avoid the confusion of having two distinct names for similar wares which are genetically and morphologically related, I added "Saliz variety" (named after the Saliz Mountains, which are in the vicinity) to the type name of "San Francisco Red."

From firing and refiring tests, and from petrographic analyses, it seems likely that all three wares were made from the same clays and tempering materials, which were locally derived.

The fact that the SU village yields only undecorated pottery (except some Three Circle phase pottery from the reoccupied house, D) may indicate that this site possesses some antiquity.

ARTIFACTS

In 1941, 676 stone artifacts were excavated at the SU site. This total is made up of twenty-two types: twelve in the "Ground and Pecked" class, seven in the "Chipped Stone" class, and three in the "Polished Stone" class.

This number of 676 stone artifacts added to the 316 found at the SU site in 1939 (Martin, 1940, p. 34) makes a grand total, to date, of 992 stone artifacts which belong to the Pine Lawn phase.

A careful comparison of these stone tools with those from other time levels and cultures brings forth some points of interest.

Similarities to Cochise artifacts are numerous. Many of the stone artifact types from SU have their counterparts in the Cochise culture, as is shown by the fact that, of the thirty-six stone traits in the Cochise culture, thirty-five were present at the SU site. This statement is not based on superficial comparisons but on a minute, detailed study. Where possible, SU tools were compared with actual Cochise specimens or with Sayles and Antevs' (1941) published photographs and descriptions. About one-third of the SU stone-tool types have counterparts in the earliest Cochise stage—Sulphur Spring; over one-half in the Chiricahua stage; and about one-twelfth in the San Pedro stage (see pp. 178 and 179).

Four of the types of artifacts found at SU approach more nearly types found in the Georgetown and San Francisco phases of the Mogollon culture. These include some of the projectile points, the tubular stone pipe with separate bone stem, notched awls, and the trough-type metate.

The Mogollon trough-type metate (trough open at one end only) is not at all like the Anasazi metate. Unfortunately, photographs do not show the pronounced differences. The Mogollon troughed

metates (milling stones) have rounded contours, constricted sides at the open end, and no shelf. In other words, the ancestry of the Mogollon metate is a basin, milling-stone type. In the Pine Lawn phase (see p. 120) and also later, one side of the basin was removed, thus creating a trough-type metate (trough open at one end only). This trough type, one side of basin open, occurs infrequently at the SU site (only fifteen such out of a total of fifty-nine metates for both seasons).

Some traits, such as natural and saucer-shaped olivella beads, disk beads, hammer stones of the pebble and core types, the full-grooved maul, and random stone flakes, are found all over the Southwest. Such traits, therefore, can not be used for making any comparison, culturally or chronologically.

Four traits—lateral notched projectile points (four found, mostly near the surface), rectangular symmetrical manos with parallel grinding surfaces (three found), conical clay pipes, and short, stubby, massive bone awls—bear some resemblances to Anasazi types.

Only one Hohokam-like trait occurs at the SU site and that is the abrading slab or paint-grinding stone.

Summarizing the data on stone tools, I would call attention to the fact that they are relatively "primitive;" that is, the stone tools consist mostly of random natural-surface flakes or nodules which were selected as suitable for cutting and scraping. The natural surfaces of these random flakes are unmodified except along the cutting edges, which show some chipping. The chipping may have been caused by use or by intentional retouching. A few stone tools have surfaces which have been entirely retouched.

Most of the stone implements appear to be representative of a stable stone-industry tradition extending back to the beginning of the Cochise culture. Certain stone implements, such as basin-shaped trough metates and diagonal-notched projectile points, probably developed in the Pine Lawn phase (or at about that time); and these, plus many of the types inherited from the earliest manifestation of Mogollon—the Cochise culture—were retained in the later Mogollon phases. Thus it seems fairly clear that the Pine Lawn phase (see p. 122) had its roots in the remote Cochise and a few branches in the later Mogollon culture.

In the 1941 season forty-one bone implements were found. These, with the twenty-eight found in 1939, bring the total to sixty-nine specimens. Bone awls with side notches occurred. Although no bone "pins" were excavated in 1941, more short bone awls were recovered than in 1939. One end scraper (none in 1939) was found.

BURIALS

Twenty burials were found, some in pits in the houses and some in pits outside the houses; all the skeletons were incomplete and in a very delicate condition. Fourteen of these burials were flexed, five were possibly secondary burials, and one was extended. There was no intentional orientation. Grave offerings were extremely rare, although four instances (out of twenty burials) occurred. These offerings were: (1) unworked animal bones (deer) and about one-third of an Alma Plain jar; (2) two stone mortars; (3) some mineral pigments and several bone awls; and (4) a quartz crystal and a projectile point.

Since all portions of all the skeletons were incomplete, no new data on racial sub-types were acquired. A close study of the available skulls makes possible the guess that these would conform to the Pueblo type.

TREE-RING DATES

The charred roof-beams sent to Mr. W. S. Stallings, Jr., have not as yet yielded any dates. This wood is difficult to date and more comparative material is needed before results can be achieved.

ARCHAEOLOGICAL SURVEY

During the summer, two square miles were intensively surveyed for archaeological sites. Fifty-seven were located and 1,337 sherds were gathered and analyzed. Of these, forty-two sites have been classified as follows (the remaining fifteen sites could not be classified):

Type 1, seven sites: surface remains of stone architecture with no pottery.

Type 2, seventeen sites: sherd areas.
Nine, Pine Lawn phase.
Eight, Georgetown and/or San Francisco phase.

Type 3, eighteen sites: small pueblos, yielding black-on-white and textured pottery, and all belonging to the Three Circle phase.

All the sites pertaining to the Pine Lawn phase were very small, with little or no surface indications of pit house depressions. Certainly, no village or collection of pit houses as large as the SU site was discovered.

PINE LAWN PHASE

At the end of the 1939 season, enough data were not on hand to fit the SU site into any classificatory scheme.

Since then, however, we have continued our excavations, researches, comparisons, and arguments. We now feel, therefore,

that it is time to set forth our conjectural classification of the SU site.

We have used the Gladwin system, which is cumulative. It consists of units of individual culture traits of identities and differences, which in turn are combined into larger categories; these, in turn, go to make up the next larger categories.

This Pine Lawn phase as outlined here has been submitted to Haury, Lehmer, Mera, and Rinaldo for criticism and changes.

The name "Pine Lawn" was chosen because it represents a minor geographical feature of the country in which the SU site is located.

Branch name: Mogollon.

Phase: Pine Lawn (Pre-Georgetown).

Predominant (70 per cent frequency or more) traits of Pine Lawn phase from excavated SU site:

Economy: Primarily food-gathering (seeds, berries, bulbs, roots, insects), with some hunting and agriculture. Probably no fishing, for no fish bones were found.

Houses: Irregularly shaped pit houses, sometimes with lateral entrances on east; varying number of roof supports; no firepits; usually miscellaneous pits of varying sizes in floor. Also surface houses, of irregular shape, with wattle-and-daub walls and roof; varying number of roof supports, pits of various sizes in floor (for accumulating food supplies for winter use?), but no firepits.

Pottery: Alma Plain (burnished, unslipped brown ware), Alma Rough (unburnished, unslipped brown ware), and San Francisco Red, Saliz variety (slipped, polished red ware). All indigenous types; no intrusives. All made from same clay.

Stone tools: Plano-convex choppers, typical side scrapers, crudely chipped core implement; basin metates, boulder and pebble mortars, disk and oval manos, typical trough-type metates, multifaced pestles. No grooved axes of any kind.

Characteristic types of Pine Lawn stone tools (about 70 per cent) are "primitive;" that is, the stone tools consist mostly of random, natural-surface flakes or nodules which were selected as suitable for cutting and scraping. Conversely, characteristic Anasazi stone tools are predominantly intentionally shaped. The natural surfaces of the Pine Lawn random flakes are unmodified except along the cutting edges, where some chipping may be observed. Very few tools have surfaces which have been entirely retouched. Most of them represent what appears to be a stable, stone-industry tradition extending back into the Cochise culture.

Bone tools: Notched awls; pins.

Pipes: Shouldered and tubular types.

Trash mounds: None.

Dates: None obtained; probably pre-A.D. 500.

Branch derivation: From Mogollon root.

Range: Unknown.

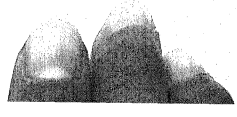


DIAGRAM OF RELATIONSHIP

Georgetown (A.D. 500?)

PINE LAWN

(Cochise stages?)

Mogollon branch

Playas stem

Mogollon root

CONJECTURES

In the Introduction, I set forth briefly the status of the Mogollon problem. At the risk of too much repetition, I should like to recapitulate in this context.

For many years the Anasazi (or Basket Maker–Pueblo) culture has been generally accepted as an entity. It was octopus-like in proportions, as it embraced everything in the Southwest. Later, several students, among them Kidder and Kroeber, recognized that in southern Arizona there flourished a culture which could not be equated with Anasazi (Kidder, 1924, p. 112; and Kroeber, 1928, pp. 387 ff.). Still later, through the field work of Gladwin, Haury, and Sayles, this "different" culture in southern Arizona was further investigated and called Hohokam.

Now, after the lapse of several years, the Hohokam desert culture is definitely recognized and accepted as separate from the Anasazi plateau culture of northern Arizona and New Mexico and southern Utah and Colorado.

The Mogollon culture, as the third major archaeological subdivision of the Southwest is called, is not yet universally accepted by archaeologists as a probable separate entity. Although geographically the culture is located approximately in the center of the Southwest, some archaeologists speak of it as "peripheral" or as a "hybrid" of Anasazi and Hohokam.

A fourth subdivision—the Patayan—has also been set up in the archaeology of the Southwest, but as this paper is concerned with the SU site and its relation to the Mogollon culture, this Patayan subdivision will not be here treated.

There is always a certain amount of psychological inertia to be overcome when a new idea is advanced. It requires energy and

time to understand and evaluate all the evidence which is advanced to support new working hypotheses, and many of us are too preoccupied to expend this energy.

At any rate, the Anasazi culture has been accepted as one which developed early, independently, and widely. Supposedly, its growth took place in the San Juan River Valley and from there it spread to many other Southwestern cultures and to the "peripheral" areas such as the Mogollon.

I was, until recently, among those who accepted these ideas.

The case, as I have stated it, may be overdrawn. But I should like to point out that what started out as a tentative theory to explain the Anasazi culture has now become a dominating theory, partly because it has been known longer and talked of and written about more.

The Anasazi culture, as set up at the Pecos Conference and later by various authors, was—and is—a working hypothesis, a tentative, working supposition or a series of assumptions set forth without proof. It is not a fact, however. Unhappily, it has now become a ruling theory and much evidence is bent to fit this ruling idea.

Therefore, although I can name certain culture traits that are called typical or "pure" Anasazi—houses with contiguous rooms, often masonry, stoned, and communal; the kiva; black-on-white or -gray pottery, polychrome or glazed painting on pottery, and corrugated pottery—yet these accomplishments do not prove that the Anasazi culture developed early or independently or that it was the mother of all other Southwestern culture traits.

Now that we have more data, it might help to solve this problem of the separateness of the Mogollon culture if I try to give a tentative definition of the Mogollon culture.

TENTATIVE DEFINITION OF MOGOLLON CULTURE

The Mogollon culture, whose origins are yet unknown, existed in what is now west-central New Mexico and east-central Arizona, in the drainages of the San Francisco, the Blue, the Black, the San Simon, the Whitewater, the San Pedro, and the upper Gila.

The commonest elements of Mogollon culture are:

Houses, surface or pit (if present); irregularly shaped, crude, not standardized, and not contiguous.

Pottery, not present in incipient Mogollon stages, but appearing about 500 B.C. (from the South?); plain, undecorated, polished and unpolished brown, and polished, undecorated red.

Earliest stone artifacts: percussion-flaked knives, scrapers, and choppers, as well as one-handed, unshaped handstones, milling stones, basin metates, mortars.

Retouching technique only in latter Mogollon periods (projectile points).

Economy, principally food-gathering (seeds, berries, nuts, roots, bulbs, insects) in incipient Mogollon stages, with little dependence on hunting or, later, on agriculture.

Deep pits for cooking and food-storage.

Settlements, small and scattered, with length of occupation problematical, but probably not of great duration.

No kivas.

No axes.

No altars.

The chronology is not yet established; but if Cochise and all later Mogollon phases (Pine Lawn, Georgetown, San Francisco, etc.) are related, or if all later Mogollon phases grew out of the Cochise stages by continuous transitions (which I think they did), earliest dates would be several millennia before Christ, with an upper limit of A.D. 700. After A.D. 700 (approximately), Anasazi traits spread into northern and eastern parts of the Mogollon area, and Hohokam into the western part of the area, the former creating Mimbres (Mogollon plus Anasazi) and the latter, the San Simon(?) or some related branch (Mogollon plus Hohokam).

Mogollon culture was an undeveloped, unsophisticated, unalloyed, unvarnished, homespun kind of culture with no striking or dramatic features. The general Mogollon cultural pattern was unadorned and lowly and based on almost minimal requirements. It was homogeneous, non-expansive in that it probably sought no, or few, contacts with other cultures. I should guess that the people of this culture were mild, timid, retiring. The few traits which drifted in to them from the South(?), such as houses, agriculture, and pottery, were not reworked and were thus not stamped with strong Mogollon character, or woven into the Mogollon pattern. These traits remained outside, as it were, of the warp and weft of the culture. I have the feeling that the Mogollones never became intimate with agriculture or with house-building or even with pottery, but continued to love and use their old household goods—stone artifacts, inherited from the Cochise days; and when Anasazi influences drifted into the Mogollon area, the resistance of the Mogollon culture was so mild that the Anasazi culture became the dominant one.

Although the Mogollones had not thoroughly assimilated certain southern(?) traits (for example, agriculture and pottery), yet they

may have been unconscious agents in passing these traits on to the Anasazi and the Hohokam.

Even after the Anasazi culture dominated the Mogollon, a few Mogollon traits persisted in later Anasazi tradition—firing pottery in an oxidizing atmosphere (to produce browns and reds), polishing on pottery, design layouts, pottery with smudged interiors.

It might make this definition and discussion of the Mogollon culture clearer if I include a list of traits which are distinctive, traits held in common but differing typologically, traits that are common to Mogollon–Basket Maker and to Basket Maker–Hohokam, and, finally, traits that are common to all three cultures. It should be understood that this list is subject to revision. The term Basket Maker is here used instead of Anasazi to denote a time level before A.D. 700.

COMPARISON OF MOGOLLON, BASKET MAKER AND HOHOKAM BEFORE A.D. 700

I. Distinctive Traits

Mogollon	Basket Maker	Hohokam
Long entryway to house	Disk pot cover	Rod (stone)
Multiface pestle	Spatula	Anvil for pottery
Deep pits for cooking and food-storage	Wrench	Reamer
	Dice	Plummet
Paint-grinding stone	Needle	Dipper
Bone skewer	End scraper	Ring
Side-notched bone awl	Scapula scraper	Carving in round
Food-gathering economy	Cornucopia	Cigarettes
		Cremation
		Trash in mounds

II. Traits differing typologically

Mogollon	Basket Maker	Hohokam
Long oval pit house	Round pit house	Squarish pit house
Eastern orientation of house	Southern orientation of house	House not oriented
No ax	Side-notched ax	Three-quarter groove ax
Basin metate	Scoop type metate	Full trough metate
Disk mano	Rectangular mano	Rectangular mano
Side-notched awl	Stubby bone awl	Carved bone awl
Red-slipped, and plain, unslipped brown pottery	Gray pottery	Unslipped, plain brown pottery
Side-notched arrow-point	Diagonal-notched arrow-point	
Plano-convex chopper		

III. Traits held in common by the Mogollon–Basket Maker cultures

Pipes { cloudblower type, Basket Maker tubular type, Mogollon	Pottery loop handle
Inhumation, flexed	Pottery ladle
Sheet trash	Full-grooved maul
	Atlatl stone

IV. Traits held in common by the Basket Maker–Hohokam cultures

Use of turquois
Parallel-sided mano
Disk bead
Clay human effigy figurine
Rectangular house floor plan

V. Traits common to all three cultures

Simple bone awl
Crystals
Side-notched chipped blade
Hammer stone
Cylindrical pestle
Single-fisted mano
Mortars (boulder and pebble types)
Natural olivella shell beads
Thin shell bracelet
Shallow pottery bowl
Globular pottery seed-jar
Jars with necks

CONJECTURES CONCERNING SEPARATENESS AND ANTIQUITY OF MOGOLLON

To explain my definition of the Mogollon culture and to clarify my guesses concerning its right to a taxonomic entity, I shall set forth the available data. These ideas should be accepted as working hypotheses that are to be used in determining facts and not for proving a proposition. It is hoped that these ideas will suggest lines of inquiry in order to obtain more facts and their explanation.

Many people interested in the Mogollon problem do not distinguish between the pre-Georgetown phases and the later, hybrid phases—San Francisco and Three Circle. I believe that all Mogollonists would guess that after A.D. 700 a surge of Anasazi influence penetrated the Mogollon area (in the general area around the Mogollon and White Mountains) and that this produced a mixture which we call Mimbres. But this is not Mogollon any longer.

My remarks, then, refer to a pre-A.D. 700 (a pre-Georgetown) period.

It seems probable that the Mogollon culture experienced a considerable, independent development before the San Francisco phase, which has been given an approximate, terminal date of A.D. 900 (Haury, 1936a and 1941; Nesbitt, 1938), and before the Georgetown phase, which has been given an approximate, terminal date of A.D. 700 (Haury, 1936a, p. 123, and 1941, p. 96). As far as we can tell now, this pre-A.D. 500 Mogollon development was independent of Anasazi or Hohokam cultural influences. After A.D. 700 (to reiterate) we admit that Anasazi influences poured into the Mogollon area and altered the general character of the Mogollon culture.

But, one will ask

(1) How can you be sure that these dates for Georgetown (A.D. 500–700) and San Francisco phases (A.D. 700–900) are approximately correct? Do you have tree-ring dates for these phases?

We do not have any tree-ring dates for the Georgetown phase or for the date of the incipient stages of the San Francisco phase; but we can establish a fairly accurate chronology by means of cross-dating.

(2) And if you cannot establish the chronological positions of the Georgetown and San Francisco phases, does not your argument about the independent entity and development of Mogollon collapse?

Yes, our argument would collapse if we could not establish the chronology of the Georgetown and San Francisco phases; but I believe our approximate dating is reliable because we can fall back on cross-dating. By utilizing this method, we can state with some assurance that San Francisco-like and Three Circle-like trade(?) pieces have been found in Anasazi villages, which, by means of tree-rings, have been dated at A.D. 700–950:

1. Alma Plain (a Mogollon pottery) at an Anasazi village, Site 4, near Ackmen, Colorado (Martin, 1938, p. 275).
2. Alma Scored (a Mogollon pottery) at Site 4, near Ackmen, Colorado (Martin, 1938, p. 273, called "incised, plain ware"); at Kiatuthlanna(?) (Roberts, 1931, p. 122).
3. Woodruff and Forestdale Smudged at Shabik'eschee near Chaco Canyon (Roberts, 1929, p. 117); at Sites 18 and 19, southwestern Colorado (Morris, 1939, p. 157, plate 269); at Piedra village in southwestern Colorado (Roberts, 1930, p. 79); at the sites near Allantown, north central New Mexico (Roberts, 1940, pp. 14–15); at Kiatuthlanna, in eastern Arizona (Roberts, 1931, pp. 117–118); and at Tseh So, in Chaco Canyon, New Mexico (Brand, Hawley, Hibben, et al., 1937, pp. 86, 167, 170).
4. San Francisco Red (a Mogollon pottery) at Tseh So (Brand, Hawley, Hibben, et al., 1937, p. 170); at Cahone Canyon (Martin, 1939, p. 453); at sites in the La Plata Valley (Morris, 1939, p. 157); in northeastern Arizona (Morris, 1936, p. 36, lines 15–20); and in Segi Canyon, Cave 1 (Guernsey, 1931, p. 91).
5. Another Mogollon trait, Mogollon-type notched bone awls, is found in Anasazi sites dated at about A.D. 700–950: at Shabik'eschee village (Roberts, 1929, plate 21); at Site 2, Cahone Canyon (Martin, 1939, p. 426); in the La Plata district (Morris, 1939, plate 102, *e*).

It seems fairly safe, then, to state that these Mogollon traits belonging to the San Francisco phase must have been in existence as early as A.D. 700 or 800.

Furthermore, it is possible to derive some assistance from checking on the dated Anasazi traits that drifted into the Mogollon area. For example, White Mound Black-on-White pottery, dated at about A.D. 700, was found by Haury in the San Francisco phase at Mogollon 1:15 (Haury, 1936a, p. 26) and in the Forestdale phase (A.D. 600–800) at Bear Ruin, Arizona (Haury, 1941, pp. 84, 96).

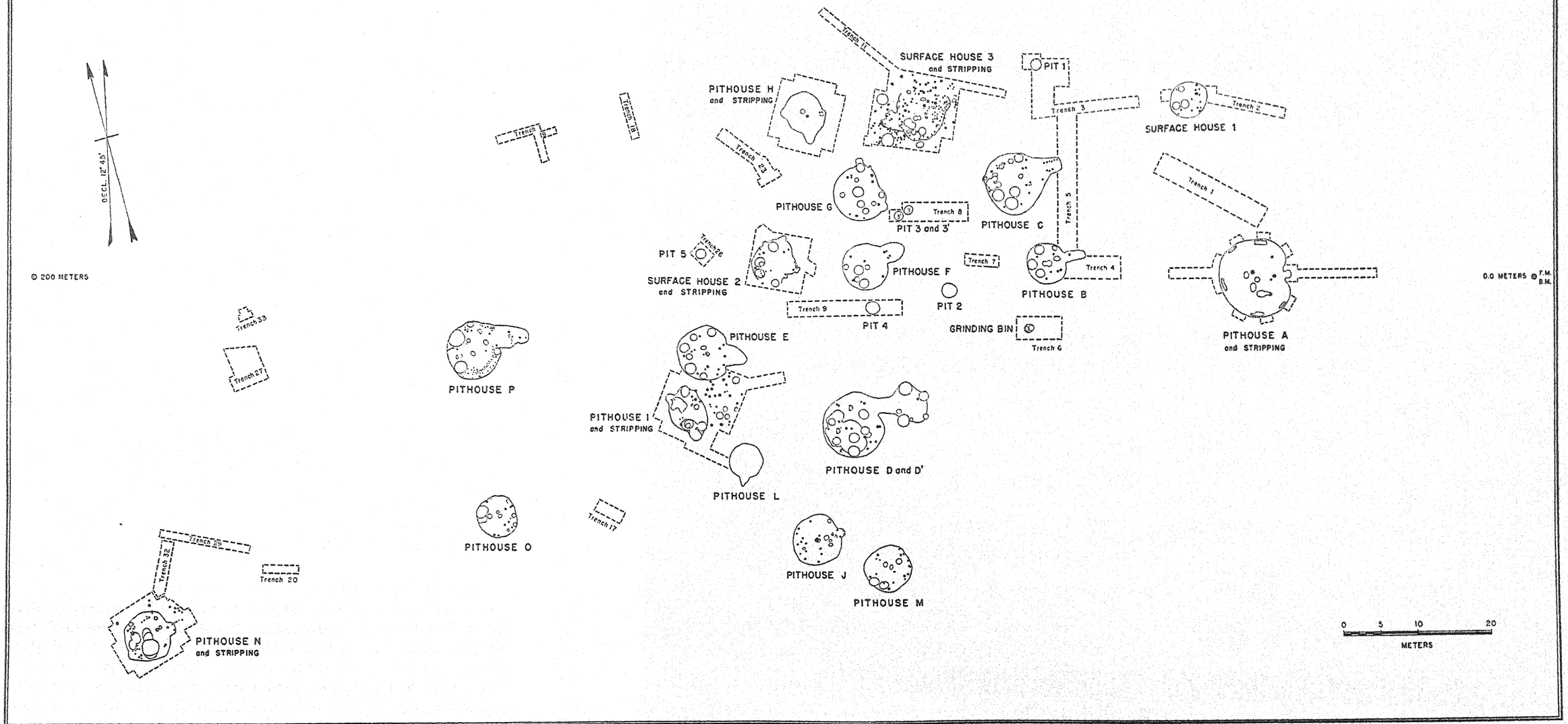
Thus, by cross-dating, the San Francisco phase of the Mogollon culture may be safely placed as occurring between A.D. 700–900.

If this dating be approximately correct, then the Georgetown phase, which stratigraphically underlies (and therefore presumably precedes) the San Francisco phase (Haury, 1936a, pp. 93–103; Nesbitt, 1938, p. 84) must have occurred before A.D. 700. Since it is reasonable to assume that the Georgetown phase was of a moderate duration, say two hundred years, we may tentatively date the Georgetown phase at A.D. 500–700.

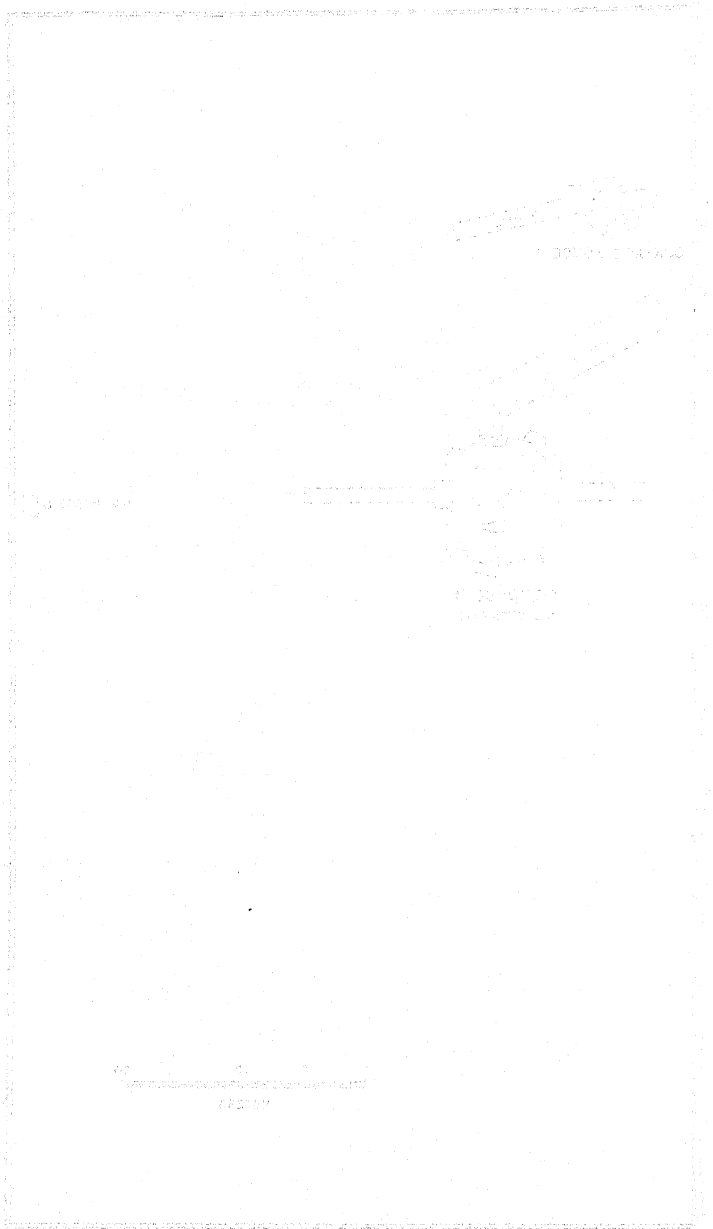
DATING PINE LAWN PHASE AT SU SITE

Since the Pine Lawn phase appears from typological evidence to precede the Georgetown and San Francisco phases, it is probably earlier and must antedate A.D. 500. One of the principal differences between the Pine Lawn (SU site) and Georgetown phases is that the Pine Lawn phase lacks *entirely* any painted, decorated, or textured pottery.

A complete review of all the information at hand—crude, variable, unorthodox pit houses with no standardized or crystallized type; primitive stone tools (see pp. 121 and 177 for description), which seem to have been closely related to the ancient Cochise types; a food-gathering economy with little hunting or agriculture—makes it possible to conjecture that the Pine Lawn phase (at SU site) antedates the Georgetown phase. If the dating of the Georgetown phase (as explained on pp. 126–127) is reasonably correct—and I believe it is—then I would place the Pine Lawn phase at the SU site as earlier than A.D. 500, using that date as a terminal one. I can not at present state how much earlier the beginning date for the phase was, but I hope that an exact chronology can eventually be worked out from tree-ring data (for other predominant traits of the Pine Lawn phase see p. 121; for Georgetown and San Francisco characteristics see Haury, 1936a, fig. 30; and Haury, 1941, p. 125).



MAP 14. ENLARGED DRAWING OF RECTANGLE OUTLINED ON MAP 18, SHOWING EXCAVATED AREA



Therefore, by utilizing all the data at hand, we conclude that the Mogollon phases are probably as follows:

	A.D.
San Francisco phase	700–900
Georgetown phase	500–700
Pine Lawn phase	?–500 (SU site)

IMPORTANCE OF COMPARATIVE FREQUENCIES IN EVALUATING MOGOLLON PATTERN

In order to view this question of Mogollon priority and separateness, I shall approach it from another angle.

In a restricted geographic and cultural area such as the Southwest, different traits and ideas probably circulated and traveled from area to area—desert to plateau. The fact that shell for Mogollon bracelets (or possibly the manufactured articles themselves) came from the region around the Gulf of California makes me believe that occasionally one would find that borrowing occurred. If this assumption were not correct, we would not be able to explain the spread of agriculture or pottery-making. Indeed, the significance of a culture is measured not by the cultural elements themselves—no one of which may be exclusive to the area—but rather by their combination into a particular pattern.

Therefore, differences between Southwestern cultures must be based on comparative frequencies (not alone on presence or absence of certain traits in the cultures under study); on a complete understanding of the distinguishing qualities of traits that *seem* similar; and, finally, on a close scrutiny of the combination of these traits into a particular, significant, integrated pattern. The pattern of culture traits here described forms the Mogollon complex, pattern, or configuration.

For example, the short or stubby, massive, metapodial awl is probably characteristic of early Anasazi culture as it appears with great frequency at most Basket Maker sites. Such an awl occurs rarely in early Mogollon stages. This type of awl, then, may be classified as typical of early Anasazi culture and would help, along with other characteristic or predominant traits, to set off an Anasazi site from a Mogollon or Hohokam site. Also, the Anasazi, Hohokam, and Mogollon peoples lived in pit houses. But no one acquainted first-hand with these three types of pit houses would ever confuse one with the other or would think that they were identical. Each house-type possessed distinctive features.

Therefore, to make our comparison between Mogollon, Hohokam, and Anasazi more telling, we must select a period when intercourse and trading between the three cultures were at a minimum. To do this, we must select for comparison, horizons and sites which are earlier than A.D. 700. Thus, we shall deal with the Georgetown and Pine Lawn phases for the Mogollon, with the Modified Basket Maker and Basket Maker phases for the Anasazi and with the Pioneer period for the Hohokam.

Early Anasazi houses (Kidder and Guernsey, 1919, p. 43, fig. 18; Morris, 1936, p. 35; Morris, 1939, pp. 63–64, fig. 9, plate 24; Alkali Ridge report by J. O. Brew, in press) may be described as follows: shallow pit houses with a slab-faced bench or pit-bank; an adobe and/or slab partition wall between fireplace and entrance; slab bins in corners of main room at sides and near entryway; roof flat and supported by four posts set in periphery of room; upper walls consisting of framework of slanting poles, ends of which were set in wall or bench, if present; lateral entryway, with antechamber, oriented towards south or southeast.

Mogollon houses of the Pine Lawn phase (Martin, 1940, and this report) lacked antechambers, partition walls, slab-linings of firepits. Furthermore, the roofs of early Mogollon houses were not supported in any standard fashion, as were the Anasazi roofs. Instead, one finds anywhere from one to six primary roof supports set apparently in higgledy-piggledy fashion (except the single roof support, which was placed near the center of the house) and never twice in the same way. Early Mogollon houses are irregular in shape, resembling an amoeba—and are very shallow. Lateral entrances to Mogollon houses are not always present but when these entryways are found they may be short and stubby, or long with upward-sloping floors, and are oriented towards the east. Deep pits, sometimes several to a house, are frequently found in Mogollon houses. I know of nothing like this in Anasazi houses of the same period.

The Hohokam pit house of the earliest period, the Pioneer, is different from the Mogollon or Anasazi. It consists of a four-posted structure (with wattle-and-daub walls) placed in a deep pit, and is independent of the pit; whereas, in Mogollon houses, the excavated sides of the pit served as walls. (Little can be said about Pioneer houses, as only two have been excavated.) The pits for these Pioneer houses were deep, large, and rectangular, and the long, sloping entryway faced south. The roof was supported by a central rectangular framework composed of four upright posts and a superstructure.

The differences between early (Pine Lawn) Mogollon artifacts and those from the early horizons of the Anasazi and Hohokam cultures have been adequately dealt with by Rinaldo (Chapter V, pp. 171–235 of this report). I might briefly point out that the Mogollon people possessed no axes of any kind prior to A.D. 950. Crudely flaked core implements serving many functions (choppers, scrapers, blades) were exceedingly common. Mogollon metates are all of the basin or modified basin type. Sometimes the latter superficially resemble the Anasazi troughed metate, but actually the Mogollon type is entirely different from the Anasazi type.

Other traits may be mentioned as being characteristic of early Mogollon: bone pins, side-notched bone awls, multi-faced stone pestles, tubular stone pipes (the conical, tubular, or "cloudblower" type is rare or absent in early Mogollon phases).

Early Mogollon pottery is distinctly different from either Anasazi or Hohokam. Mogollon pottery is plain brown (polished and unpolished or slipped red) and is undecorated and untextured (no intentional scoring, indenting, or punching). Anasazi pottery is gray (probably the result of being fired in a reducing atmosphere), unpolished, unslipped; if decorated, it is black-on-gray. Hohokam pottery is unpolished; if decorated, it is red-on-buff.

Thus, it should be clear that the culture traits of the Mogollon, Hohokam, and Anasazi differ in kind as well as in type. For example, before A.D. 700, the Anasazi people employed a side-notched ax, and the Hohokam, a three-quarter groove ax. The Mogollon, possessing no ax, were perforce obliged to use a crude core chopper. Moreover, one would expect to find clusters of traits typically and abundantly present in a pre-A.D. 700 Anasazi site (such as stubby, massive bone awls, bone needles, bone end-scrapers, side-notched axes) and not similarly present at an early Mogollon (Pine Lawn phase) or at an early Hohokam (Vahki phase) site; but one might expect to find angular hammer stones anywhere in the Southwest at any kind of site—Anasazi, Mogollon, or Hohokam.

ECONOMY

The people of the SU site hunted little. This impression obtains because (1) projectile points are scarce and (2) because the total amount of unworked and worked animal bones is exceedingly small. Fishing was probably not carried on, for not one fish bone was found.

Agriculture, too, was probably an unimportant factor in the economy of the SU village. Since only a few of the SU milling stones

are of the type characteristically associated with agriculture, and since the milling tool types are like those used most often by people of a pre-agricultural stage, it seems safe to assume that the SU people lived mostly on seeds, roots, bulbs, berries, nuts, insects. This assumption is strengthened by the fact that out of the five burned houses, only one (Surface House 1) yielded a few kernels of charred corn.

That food-gathering was more important than hunting or agriculture is also suggested by one other bit of evidence: bones of all human burials were in extremely fragile condition, whereas animal bones, worked and unworked, associated in the same grave and therefore subject to the same circumstances of decay, were sound and in a good state of preservation. This may mean that the people of this village were not obtaining a well-balanced, sound diet containing enough calcium and phosphorus, whereas the animals were. This in turn may indicate that corn and game foods were not often eaten by the SU Indians, for corn and game would supply ample amounts of calcium and phosphorus, thus insuring sound bony structure.

The SU village, as exposed by excavations, consists of sixteen houses. On this same ridge, and close by, there are probably six to ten more unexcavated houses belonging to the same Pine Lawn phase. I am not certain that all the houses were occupied continuously or simultaneously, but I guess that at least eight or ten houses were all occupied at the same time. This number would constitute a fair-sized village. Why would twenty or thirty people live in a cluster like this? So far as our survey shows, the SU village is the only large Pine Lawn phase town in the vicinity. Certainly these people did not band together for protection, for we found no evidence of fortifications, war, or physical disturbances. The number of people who could live off the country and exist almost solely on roots, seeds, and berries would be limited, as the natural crop would not be bountiful. Therefore, it seems safe to state that the country would not support many towns of the size of the SU village.

I have no adequate explanation for the existence of this town. I would guess that possibly the social organization of the SU people demanded that they live in a town; or possibly this town came into being in order to provide a central, safe, communal(?) place for storing supplies and harvests (dried seed-cakes, dried pounded berries, pine nuts, and roots). These stores would provide a constant supply of food during the winter when fresh vegetables were not available. At any rate, this village may well represent the beginning

of town life in the Southwest and was a fairly stable concentration. I would not expect to find another village of this size and of this period within a radius of fifteen or twenty miles.

SUMMARY OF HYPOTHESES

The SU site (the only town of the Pine Lawn phase in the vicinity) was probably in existence prior to A.D. 500. The economy of the SU people was devoted mainly to seed-gathering, with little farming or hunting. The culture as a whole was simple as regards the development of material things. Psychologically it was timid, conservative, inflexible, partly stagnant, homogeneous, and fairly stable, though not so stable as the earlier Cochise stages. For one thing, new ideas, i.e. pottery and houses, had drifted into their ken and had upset certain phases of their life.

The stone industry had a long tradition back of it with roots going back into the earliest Cochise stages.

Pottery was probably a comparatively new trait and had not been with the SU people long enough to permit a favorite type to develop. Although there were three types, a choice between these types had not become crystallized so that one choice predominated over the other two. While variations of the SU pottery could be statistically described in averages and measures of dispersion, such treatment is premature in the absence of comparable data from other sites of the same, and earlier and later horizons. If these data were available, it might be possible to describe mathematically the crystallization of choices of pottery types that would occur probably in later times.

House-building, too, may have been a fairly new development to the SU people. Certainly they had not built houses long enough to have developed any "art form;" that is, the houses had not become standardized in any way—shape, depth, entryway, roof construction, size, location and depths of pits. Each house differed from the next one. We found no such crystallized house-type as we did in early Anasazi sites.

Nothing is known about the ritual life (I do not feel that Pit House A was ceremonial).

The Pine Lawn phase as represented at the SU site probably stands near the beginning of the Mogollon Branch, and the Mogollon culture is probably a separate entity and probably not a peripheral variant of the Anasazi or a hybrid of Anasazi and Hohokam.

I set forth these working hypotheses merely as interpretations of the available facts. We shall use these hypotheses as a means to an end; namely, seeking more facts for ultimate deduction, for possible proof, and for seeking relationships between facts. I regard the conjectures herein given as merely suggestive for future lines of inquiry.

III. DIGGING TECHNIQUES

BY

ROBERT J. BRAIDWOOD

The purpose of this section is to outline the physical processes of excavation applied on the SU site during the 1941 season. It in no way pretends to claim anything new or especially successful in digging technique, but means only to show how the particular problems of excavation on this particular site were handled.

PHYSICAL DESCRIPTION OF THE SITE

The SU site is composed of the remains of a number of individual structures, scattered village-like along the crest of a low ridge (see Martin, 1940, p. 7 and map 2).[1] This ridge is made up of residual soil, and the surface layer is usually composed of from 10 to 20 cm. of humus. The surface cover is a somewhat sparse growth of grass, together with occasional thistles, cacti, and other small plants, as well as a scattering of pine, pinyon, juniper, and live oak. The land has been used for cattle-grazing. The flat top of the ridge shows no signs of weathering, but there are a few small incipient gullies on the steeper slopes of the ridge. These steeper slopes show little grass, and often have a surface accumulation of stones and small boulders, but the more extensive gentle slopes, as well as the flat top, can have suffered little run-off. The mean annual rainfall is about 14.02 inches. At present, the nearest supply of water is in a small ditch fed by a spring about one-half mile south of the ridge.

SOIL PROFILE IN DETAIL

During the course of the season, the normal soil profile was exposed in a number of instances. The sequence, from the surface, consisted of ±15 cm. of top soil or humus; ±25 cm. of orange-brown gumbo; ±1 meter of fine, compact, oxidized and leached sandy material, yellow-orange in color; an indeterminate depth of "hard-pan" or fresh material. From samples brought back by us, Dr. Sharat Roy of Field Museum supplied the geological terminology. In his opinion, the ridge is of residual soil, and its existence is due to semi-arid climate. The surfaces of these different strata were not always in the horizontal plane, or, if nearly level, their propor-

[1] The reader's attention is called to a typographical error in Map 2 in our last season's report. The bench mark noted "Center of Sec. 13, T. 750, R 20 W." should read "Center of Sec. 13, T. 7 S., R 20 W."

tionate depths might be either compressed or telescoped. In one or two cases, the gumbo stratum seemed to be missing. Into such a soil profile the original inhabitants of the site dug the sub-surface portion of their structures. In over a dozen cases of trenches dug into the normal soil profile, usually in areas where an architectural feature was suspected but not present, the gumbo proved to be a sterile, intact layer. Our first assumption was that the underlying oxidized and leached yellow-orange zone was the uppermost sterile layer, but a sufficient number of tests were made into the gumbo to convince us of its sterility as well. Therefore, in the latter half of the season, we discontinued test trenches for pit house sub-structures when they encountered gumbo.

SURFACE INDICATIONS AND THE LOCATION OF HOUSES

In actual fact, it was already known from the previous season's experience that the SU site would produce the remains of round pit houses of ±6 meters diameter, with floors about 1 meter below the present surface. The site, as well as the first season's pit houses, had been located by the usual surface indications. Small, worn potsherds are very likely to be found anywhere on the surface of the ridge. The presence of these potsherds or the spalls of worked flint on a very shallow depression from 6 to 8 meters in diameter would usually indicate a pit house substructure. The best time to look for the shallow depressions was early morning, when the length of shadow thrown by an otherwise almost imperceptible rim around a depression could be noticed. One of the workmen, Eduardo Naranjo, had particularly good luck in choosing them; he also thought that less grass grew in the depressions. The writer was never certain whether this was a real or an imaginary criterion. Also, it can not be said that all the "depressions" tested yielded pit houses, or even that all the fertile areas opened were found by looking for depressions. Pits 4 and 5, Surface House 2, and Pit House K were intercepted by test trenches put down to test areas between known pit houses—there was no perceptible surface depression in these areas.

DIGGING CREW, SCHEDULE, AND EQUIPMENT

The field crew consisted of seven local Spanish-Americans, four students, a surveyor-photographer, and the writer. Work started at 7:00 A.M. and stopped at 4:30 P.M., with an hour and a half for lunch at noon. All tools were brought from the camp house (some

three and a half miles away) in the morning, and were returned at night. Heavy digging equipment consisted of several large picks, axes, a crosscut saw, mattocks with the adze blade kept sharpened for dressing a vertical earth profile, and a dozen light (3-pound) picks and light, long-handled spades. A wheelbarrow and a Fresno scoop and team (rented from one of the workmen) were used for dumping and refilling. Light digging and cleaning equipment included small, army-entrenching mattocks, geologists' hammers, a small, army spade, kitchen spoons, whisk brooms and paint brushes, surveyors' lining pins used as probes, grapefruit knives, and pointing trowels. Several tarpaulins were kept handy for use in cases where it was not desirable to have the soil dry quickly and harden, as, for example, in the clearance of burials. Dirt from particularly fertile areas was sieved. An ordinary spray with plunger for compression and a shoulder strap was used, with water, to increase color contrast between fill and sterile earth. The students were responsible for the distribution and checking in at night of light and heavy tools, as well as for the water bags and for loading the truck. This was all done against posted lists and soon functioned quite smoothly.

Each operation was provided with one or more tight fruit boxes ("lugs") for potsherds. At night, the sherds were put in small re-usable gunny sacks and tagged with their findspots, ready for washing and classification in the camp house. As objects were found they were put in marked paper sacks, fragile or fragmentary pieces being wrapped in a cheap grade of tissue paper. Heavier stone artifacts were put in a special pile and not returned to the camp house until the operation was complete. In the Near East, the writer had controlled the size of clods and the appearance of potsherds on a dump pile by assessing a general fine on all workmen in the operation in question. Here, of course, without the baksheesh system and its implied bonuses as well as fines, the necessary discipline was maintained by banishment of the offenders to work on a dump pile. The students, of course, took this quite seriously, but the Spanish-Americans naturally less so. However, the idea of a sort of joking disgrace about it affected them, and the sum total of 19,644 counted potsherds for the season indicates that the system was reasonably successful. The point involved here, of course, is not only the matter of neat digging and completeness of sherd count, but the fact that if all sherds are looked for, small objects will be found as well.

THE OPERATIONS ON A PIT HOUSE

The operations on a pit house, as we dug them in the current season, may be broken down into seven more or less distinct steps. These are:

1. THE TEST TRENCH

The laying out of a straight trench, about 1.5 meters wide, across a "depression" or an area suspected of being a pit house sub-structure, was the first step. Every attempt was made to lay the center of the trench through the middle of the depression, and two workmen were started working the trench from its center toward either rim of the depression. The two workmen, picking as closely back-to-back as safety allowed, proceeded downward in the center of the trench for about half a meter. If, at this depth, the dirt still had the blackened appearance of top soil, and was yielding occasional potsherds and charcoal flecks, then the probabilities were excellent that it was now "fill," an accumulation of the débris of the earth roof of the original pit house together with subsequent accumulated débris and humus. If, on the other hand, the "depression" was sterile, then this first operation in the center of the trench would encounter the orange-brown gumbo of the normal soil profile at much less than the half meter's depth. This being the case, four or five meters of the run of the trench might be taken down to the compact surface of the sterile gumbo to determine whether the trench had crossed the center of the "depression" or whether any smaller architectural feature such as a surface house had caused the apparent depression. In the first case, however, with the trench still yielding fill at a half meter's depth, the workmen were allowed to proceed downward with care until the excavated floor of the original sub-structure pit was reached. In every case, the original inhabitants had sunk their pits well down into the oxidized and leached zone, and the surface of their excavated sterile floor was easily differentiated from the fill by an abrupt change in both color and density. Once the presence and depth of this original sterile floor had been ascertained, the trench was continued out in both directions toward the rim of the depression, and the proper dump was started outside the approximated rim. In prolonging the trench both ways from the depth test in the center, the workmen were made to stay about 10 cm. above the level of the sterile floor. The final stage of the first operation was when both ends of the test trench had made contact with the vertical face of the leached and oxidized and the gumbo zones—that is, the vertical wall of the pit which the

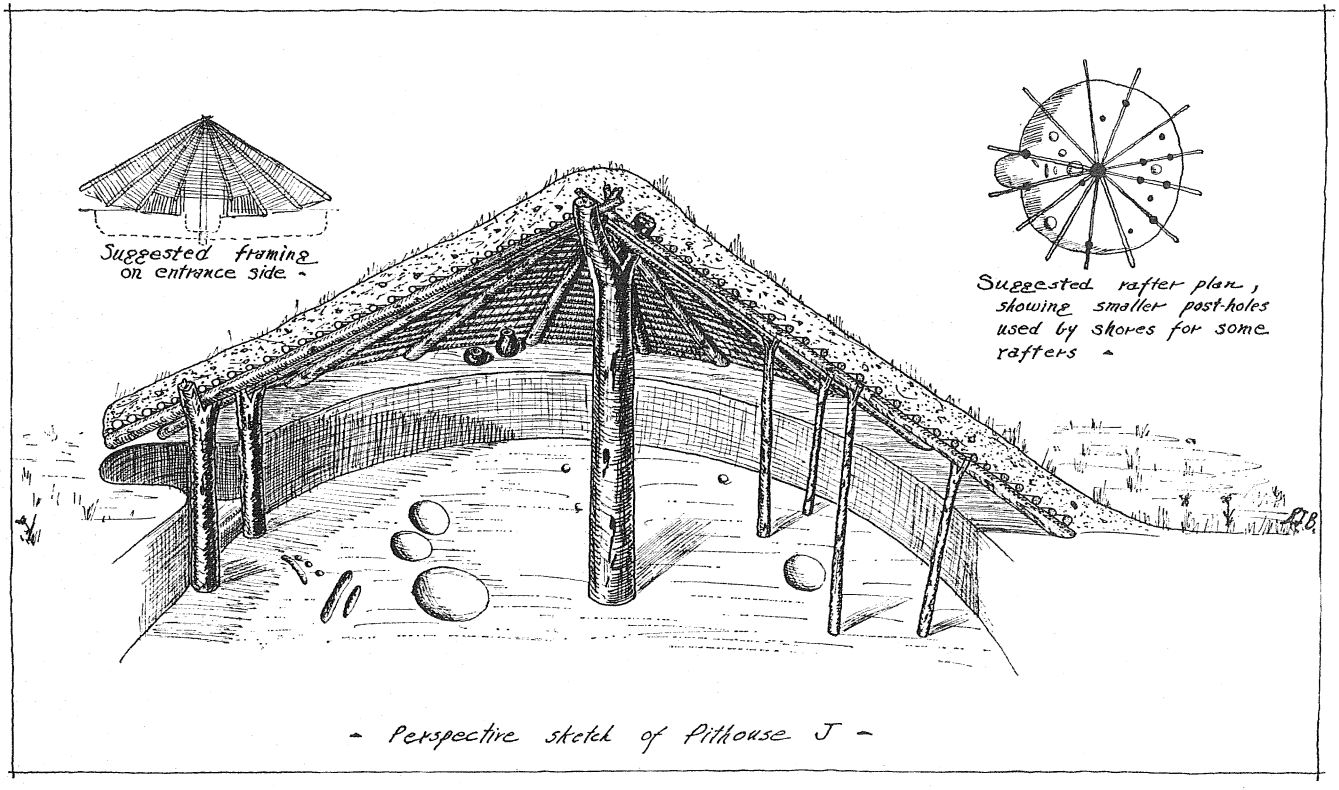


FIG. 43. Perspective sketch of Pit House J, with roof and various floor features theoretically restored. No firepit.

original inhabitants made when they dug their sub-structure into the normal soil profile. This vertical sterile face, like the sterile floor, showed an abrupt change in both color and density from the dark humus-like fill.

2. THE ENCIRCLING TRENCH

Once the test trench had determined the depth and one or both vertical faces of the pit, the encircling trench was begun. This was simply a tracing of the circuit of the vertical face of the original pit, done with the light picks by flicking the fill away from the lighter-colored vertical face, which showed the normal soil profile of gumbo and then oxidized and leached material below the top soil. This trench needed to be no wider than convenience in picking and cleaning demanded, and was not taken down beyond 10 cm. above the sterile floor. In actual fact, the entrance side was usually troublesome (cf. operations 4 and 5) since its vertical face would be somewhat more shallow, and be easily lost in tracing. The usual procedure was to trace the circuit as far as it would go, suspect an entrance on the east, and if the vertical sterile face disappeared below the 10 cm. of floor fill on that side, complete the circuit in a straight line and leave the entrance until the floor had been cleaned. The more or less straight outer edge of the circuit trench on the right side in Figure 44 is a case in point—the entrance was later developed there. Figure 44 shows the results of the first and second operations on Pit House P. The color change from top soil to gumbo is not so apparent in the photograph, but within the circuit trench, in the left foreground, the contact between the gumbo and the light-colored oxidized and leached zone is quite clear as a vertical face. By this time, the dumps were well established about the rim of the pit and were strictly kept a pick handle's length back from the edge. We also found it wise to make some effort to keep them away from the east side of the circuit, where entrances had a tendency to be placed.

3. REMOVAL OF THE REMAINING CORE

The next step was the removal of the remaining segments of fill within the pit, down to 10 cm. above the sterile floor. In the earlier part of the season, this was done in several cases in 25 cm. layers, even though the profile of the fill showed little or no signs of stratification. Figure 45 shows the last of three 25 cm. layers being removed from Pit House N, and each layer is still indicated on the column of earth which supports the tarpaulin pole in the center. Since

FIG. 44. Pit House P. Square trench in center is original trench that intercepted sterile face of pit house at either end. Circular trench traces sterile face of pit house. Looking northwest.

neither the profile of the fill nor the sherd counts from pit houses taken down in 25 cm. layers showed any perceptible differences, the general tendency was to remove the fill from the surface to 10 cm. above the floor in one layer, and to mark the sherds "surface to floor" for that pit house.

4. PRELIMINARY CLEARANCE OF FLOOR

Theoretically, this operation of primary floor clearance should follow the clearance of the entrance (if any), but in actual fact it was usually necessary to proceed all the way to the sterile floor before the entrance became apparent (see p. 140). This preliminary floor clearance, which removed the final 10 cm. of fill above the original excavated floor, was done with light tools; all sherds and objects were noted as from the floor of that pit house, and all groups of stones or any worked stone, were left *in situ* as in Figure 46, which shows Pit House J with the floor clearance completed. In this case, the entrance on the east had already been located. The traces of the original, over-large test trench are also apparent on the east and west. The sub-pits, post-holes, etc., still contain their original fill (the fill has been wetted with the sprayer to improve the contrast). The various sub-floor features such as pits, post-holes, slots, or any other area which still showed fill when the general level of the original excavated floor was reached, were outlined by taking them several centimeters below the surrounding sterile floor. When this clearance was complete, a plan photograph was made (i.e., Fig. 46, for Pit House J) and the pertinent stone groups or heavy stone artifacts were mapped.

5. CLEARANCE OF SUB-PITS, ENTRANCE, AND OTHER FEATURES

The next operation was the removal of all the floor stones and artifacts, and the removal of fill from all the sub-floor features. As mentioned above (see p. 138), the clearance of the entrance often did not come until this operation. It will be found, by reference to the architectural section of this and the preceding SU site report, that the entrances of the pit houses often came on the east side, but also that there were pit houses without any evident side entrances, and one (Pit House H) which may conceivably have had an entrance to the south. The location of the entrance was determined by close examination of the vertical face of the pit, in an effort to discover whether, at any point in this circular profile, the blackened humus or top soil intruded downwards into the gumbo or the oxidized and leached zone. If such a disturbance in the normal soil profile showed

FIG. 45. Pit House N. Column of earth in center shows thickness of layers by which core of pit house was removed. Looking southeast.

in the vertical face of the pit, it was tested, on either edge of the disturbance, with one of the small mattocks, until the vertical face of the original entrance excavation was reached. This vertical face would of course show the same normal soil profile as did the circular vertical face about the main pit, but it was always more shallow. The difficult point involved here was that the planes dividing the humus, gumbo, and oxidized and leached zones were never absolutely single or perfectly horizontal. Hence, attempts to trace what was apparently a disturbance of top soil or fill into the gumbo or oxidized and leached zone often proved groundless, as to its being an entrance, and there was now a great gap in the circuit of the main pit. Nothing could then be done but to square off the test so that it would appear as a trench, not a feature, in the plan photographs. The plan photographs of Pit Houses H, I, J, M, and O show cases in point.

As the entrance was being cleared or tested for, the obvious sub-pits and post-holes were cleared of fill and the writer started the detailed checking of the sterile floor of the main pit. This was done with the aid of the water sprayer, so as to bring up in contrasting color any areas which still contained fill. All minute black areas were marked with nails for testing. The fill in small holes had to be carefully removed so as not to disturb the sterile sides of the holes. If these, or the large holes for that matter, showed inconsistencies in diameter and left the vertical, running more or less horizontally, they were considered root or animal holes, and were not mapped. A certain number of questionable examples occurred, of course, and these are shown with broken lines on the maps.

6. THE FINAL DRESSING FOR PLAN PHOTOGRAPH, MAPPING, AND NOTATION

Along with the above operations, the final dressing of the pit house for mapping and photography was done. All vertical faces were checked for overhanging top soil, roots were cut off, and large root butts and large, light-colored stones appearing accidentally were painted with muddy water to reduce their contrast in the photographs. The dumps were dragged back with the team and Fresno scraper. The writer feels very strongly that dumps, or anything else, which by leaving a shadow or contrast, detracts from the readability of the plan photograph, is worth the trouble of removal. The surface about the pit house rim was then cleaned, the directional arrow and meter stick were set, and the plan photograph was made from a twenty-foot tower. The pit house was then mapped with a

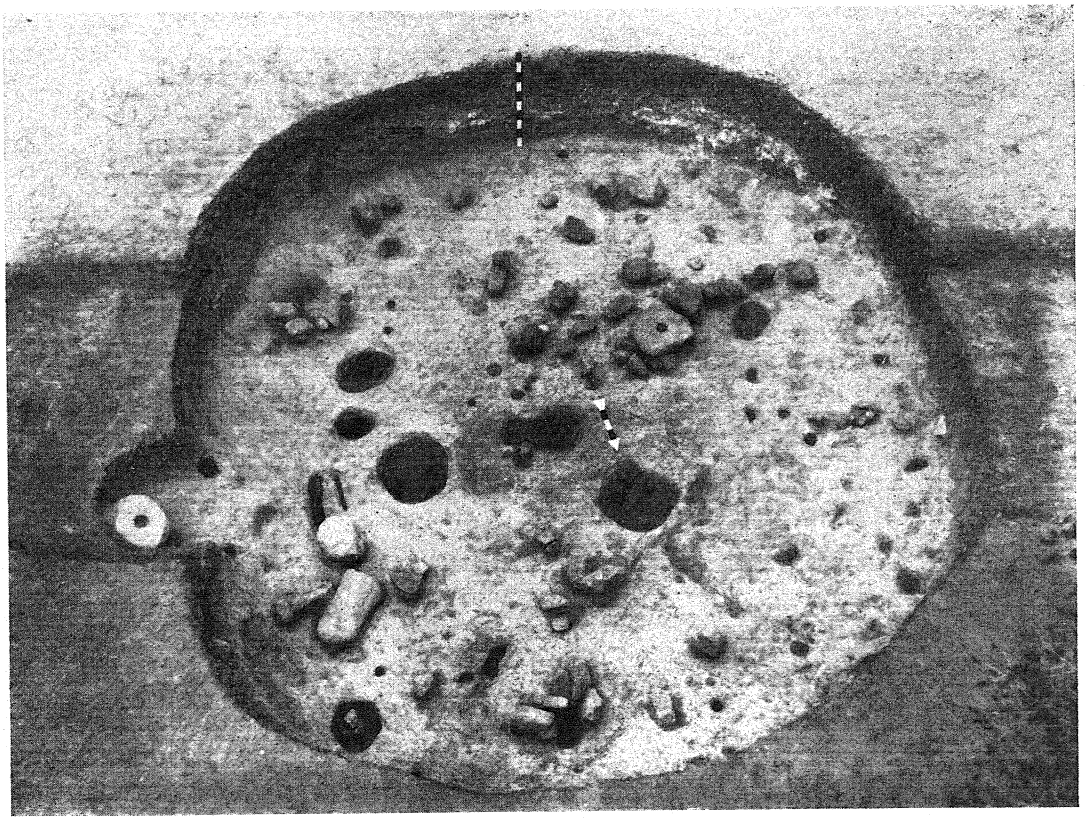


FIG. 46. Pit House J. Plan view with stones *in situ*. Arrow (50 cm. long) points north; meter stick in background.

plane-table and alidade, and the final notations were made. In usual cases, this was considered the completion, except for the final refilling of the pit house.

7. STRIPPING

For Pit Houses H, I, K, and N a further operation was made—that of stripping off a squared area beyond the rim of the pit house as far down as the sterile layer. Figure 47 shows the first stripping operation on Pit House I. It was later extended eastwards. We did the stripping first on Pit House H, being unsatisfied with the southern niche as an entrance, and also in hopes of some clue to the roof construction for central post-hole pit houses. We expected rafter butts, but did not find them or their holes. The operation was subsequently applied to the other pit houses as a general test, and the results seem to warrant the consideration of this operation as being essential to complete pit house excavation. The steps involved are essentially those of operations 4 to 6 for the pit houses —we left a thin partition of earth standing about the circuit of the pit house until the last, to keep the pit house clean. It is hoped, as in the case of Figure 47, that this will not be taken by the incautious reader or the layman, as a "wall."

OTHER TYPES OF OPERATIONS

While the pit house type of structure was the characteristic architectural feature of the site, the test trenches yielded signs of certain other forms of houses (Surface Houses 2 and 3), two fairly large outside pits (numbers 4 and 5), and in one case a group of stones of which one was a metate. The test trench was the standard operation for testing fairly large and unproven areas between known pit houses, such trenches being laid out about 1.5 meters wide and as long as a given area demanded. They would be taken down as far as the gumbo and discontinued there in usual cases, but would be extended and explored if they continued to yield fill instead of gumbo as in the first operation on pit houses. The original trench on all operations, including pit houses, was noted as a test trench (abbrev.: TT, followed by number), this nomenclature being dropped in favor of pit house, surface house, or pit terminology when recognizable features appeared. Two test trenches ($\pm$1.5 meters sq.) were put down for the sole purpose of exposing the normal soil profile in areas already assumed to be sterile.

There is no need to describe the excavation of pits or surface houses in any detail, the procedure in these cases being simply to

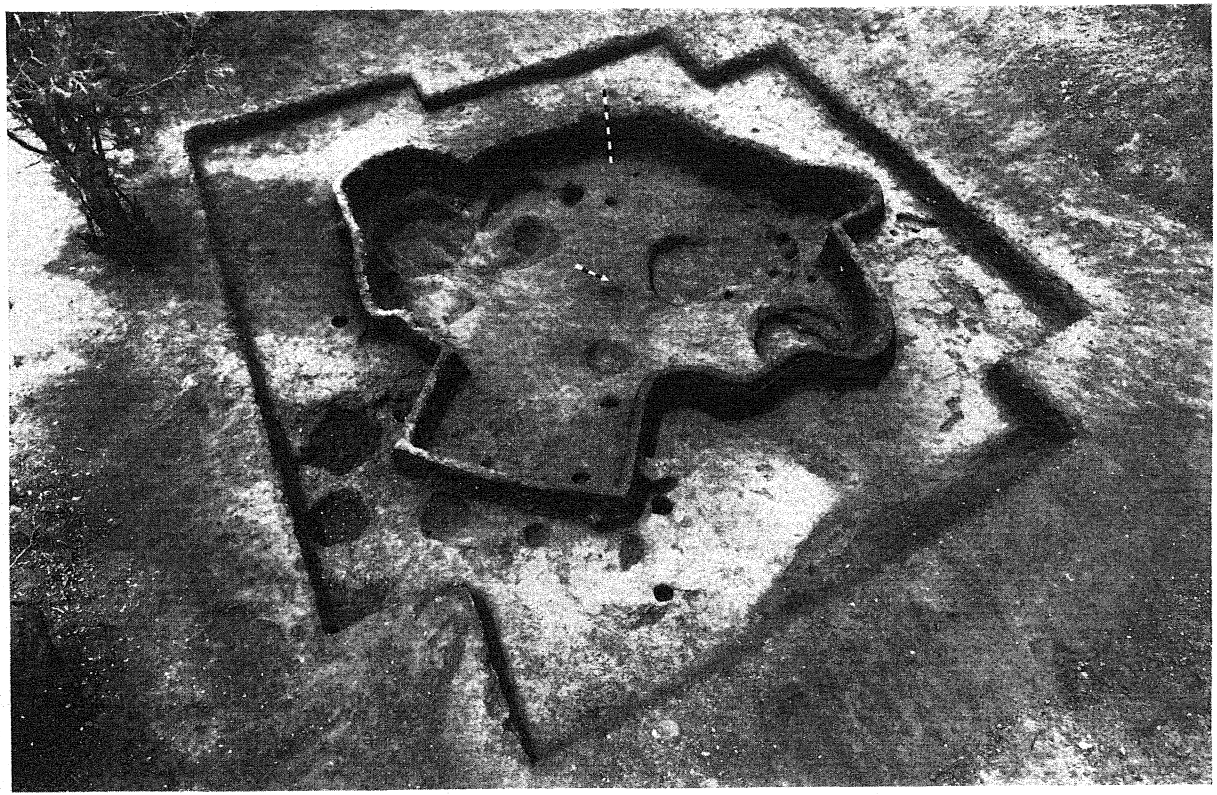


FIG. 47. Pit House I. Plan view of stripping. Apparent wall is actually fill left in place during stripping. No pits and post-holes outside of original excavated area. Traces of refilled Pit House E on northeast. Arrow (50 cm. long) points north; meter stick in background.

expand the test trenches to expose completely all the features involved, and to finish up as with the pit houses. The same is true with regard to the clearance of burials, the procedure here being that which the writer first learned in the University of Chicago Anthropology Department's "digs" in Illinois.

PROBLEMS INVOLVED

The section would not be complete without mention of certain excavational and architectural problems, which may or may not be resolved in future seasons. During the current season, there were difficulties due to an excess amount of rain. This caused flooding and loss of time. We met this as well as possible by putting small dikes about partially finished operations, and rigging tarpaulins (both are visible in Figure 45). After bad downpours, we bailed with tin cans, and then suspended work there until the mud in the operation dried.

The above-mentioned difficulties with uncertain entrances and other suspected features extending outside the general circuit of pit houses, or cases (as in Pit House M) where one edge of the pit house had been eroded away, can probably never be avoided completely. The general procedure in such cases was to square up the gaps resulting from abortive attempts to trace non-existent features, so that they would appear plainly in the photographs as something which we had manufactured. Such trench butts are shown only in light broken lines in the plans, so as not to detract from the readability of the plan of the architecture itself.

We had no success in recovering the traces of either fired areas and firepits or of the living floors. The usual compact layer of blackened fill immediately above the original excavated sterile floor, from which the general fill and débris can be flicked away, appeared only in two cases. As already mentioned, we assumed an arbitrary 0–10 cm. above the original sterile floor as "floor" material, but remained puzzled by the apparent lack of a good compact living floor. The same holds true for signs of ash or fire blackening, even in shallow sub-pits which from their position in a pit house plan might be readily assumed to be "firepits." There was neither discoloration nor hardening of the original sterile floor (probably since it was more like compact sand than clay), and there were no signs of fire in the overlaying fill. Two test fires were burned for six hours in Pit House H, one in contact with the sterile floor in the depression just north of the central post-hole, the other on

a bed of 2 cm. of fill brought in from the dumps and tamped down. The fire in contact with the sterile floor left a marked blackened area but this penetrated less than a millimeter and was not appreciably harder—the other fire left no sign on the sterile floor whatsoever after the débris had been cleaned up. One is still inclined to be uncomfortable about the apparent lack of both well-marked fire areas and floors, however.

SUMMARY OF OPERATIONS

At the end of the season all excavations were refilled with the aid of the Fresno scraper, and oats were planted on the loose soil. The season's work required about 546 effective man-days. Thirty-nine separate operations were made (of which sixteen proved fertile), and about 450 cubic meters of earth were moved.

IV. DESCRIPTION OF ARCHITECTURAL DETAILS

PIT HOUSE H

(Fig. 48 and Map 15)

Shape.—Circular; greatest diameter, 4.85 meters.

Walls of unplastered, native soil.

Floor of sterile hardpan, with some gravelly content in west; uneven, depth below present ground level, 1 meter.

Firepit.—None identified.

Deflector.—None.

Lateral Entrances.—(?)Niche-type, on south; floor 25 cm. above pit house floor. (?)Also on east, slight bulge in pit house wall containing six post-holes set in two short rows of three each; floor between post-holes slopes up and outward.

Pit.—One in north half of pit house; diameter, 60 cm.; depth, 15 cm.; use, unknown; no evidence of redness or blackness, and not used as firepit.

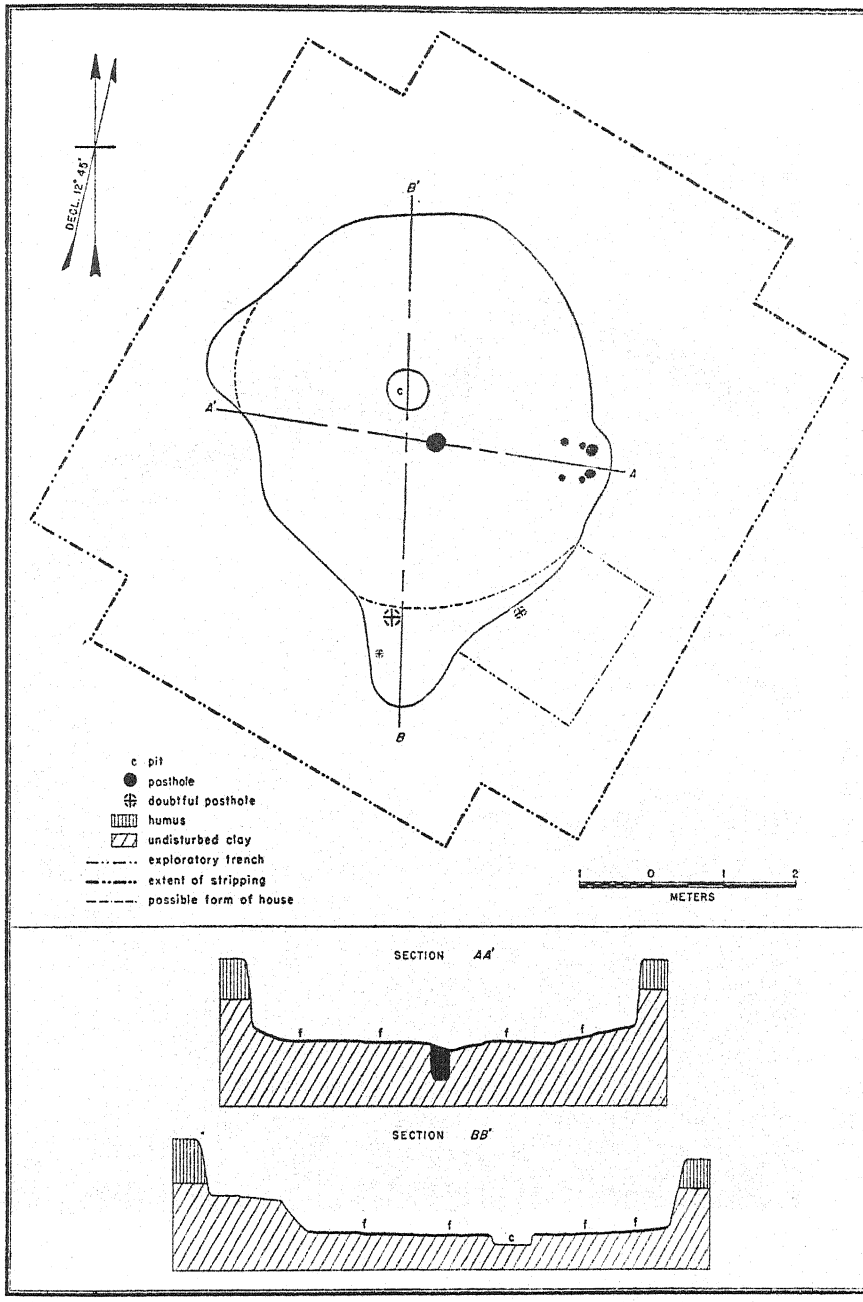
Post-holes.—Large one near center of pit house; diameter, 25 cm.; depth, 45 cm.; at bottom of hole was flat stone for founding post. Three secondary post-holes in sterile dirt just outside pit house wall; used possibly as rafter butts; diameters, about 25 cm.; depths, 15 cm.

Roof.—Umbrella-like(?); with large central post to which were attached, at sloping angle, secondary rafters (like umbrella ribs), butt ends of which were thrust in sod or in pit house walls(?).

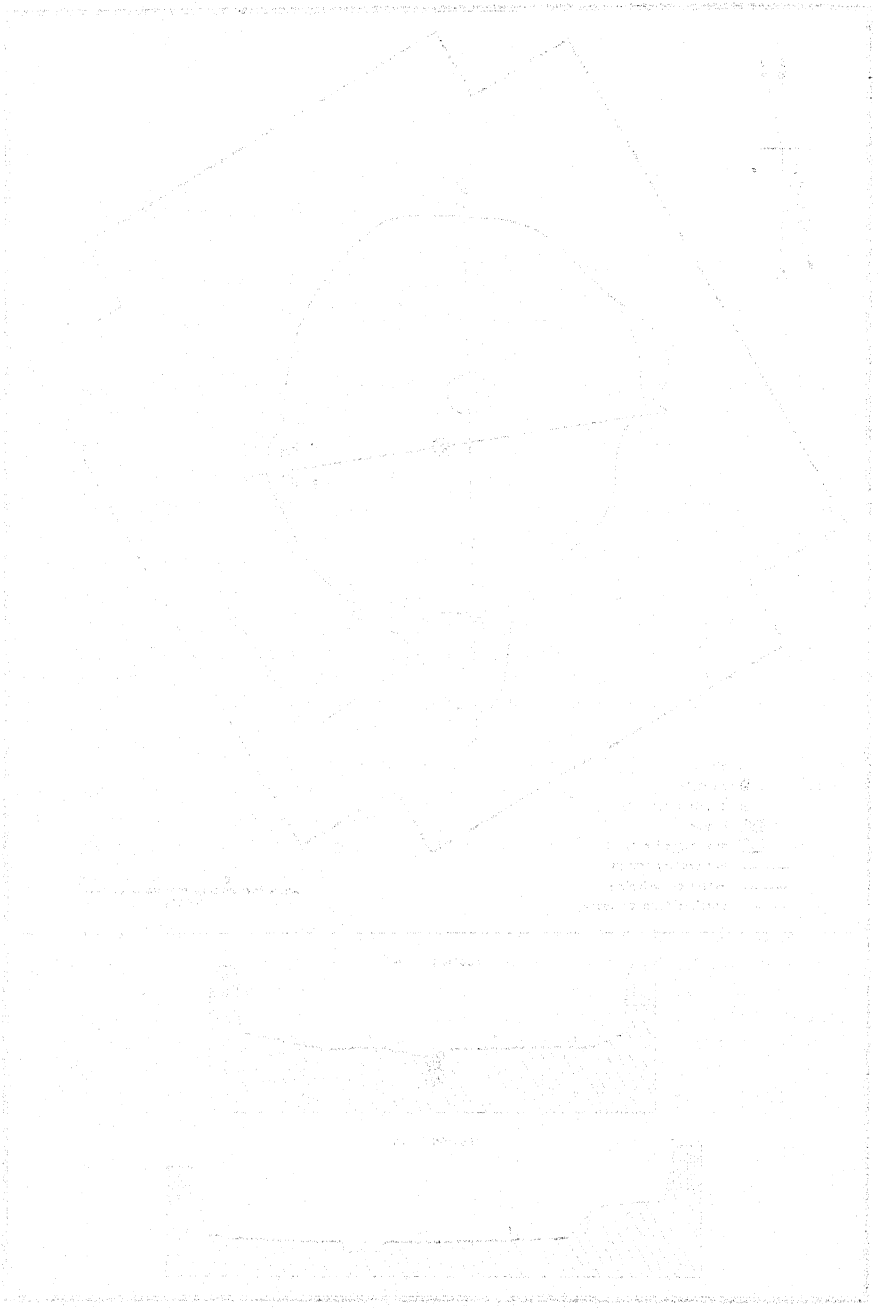
Pottery.—Alma Plain, 40 per cent; Alma Rough, 30 per cent; San Francisco Red, Saliz variety, 30 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Pit House H did not burn. Experimental burning in pit for about five hours with hot fire resulted in slight surface blackening of sterile orange floor. Purpose of experiment: to ascertain whether a fire would change soil color; and it evidently does. On west wall, slight bulge in wall with some dirt overhanging, which may have been a shelf(?). *Stripping zone* extended outward in all directions from pit house walls for a distance of about 5 meters, and was carried down a depth of 40 cm. to sterile soil. Old ground level approximately 10 to 15 cm. below present surface.



MAP 15. PLAN AND SECTIONS OF PIT HOUSE H



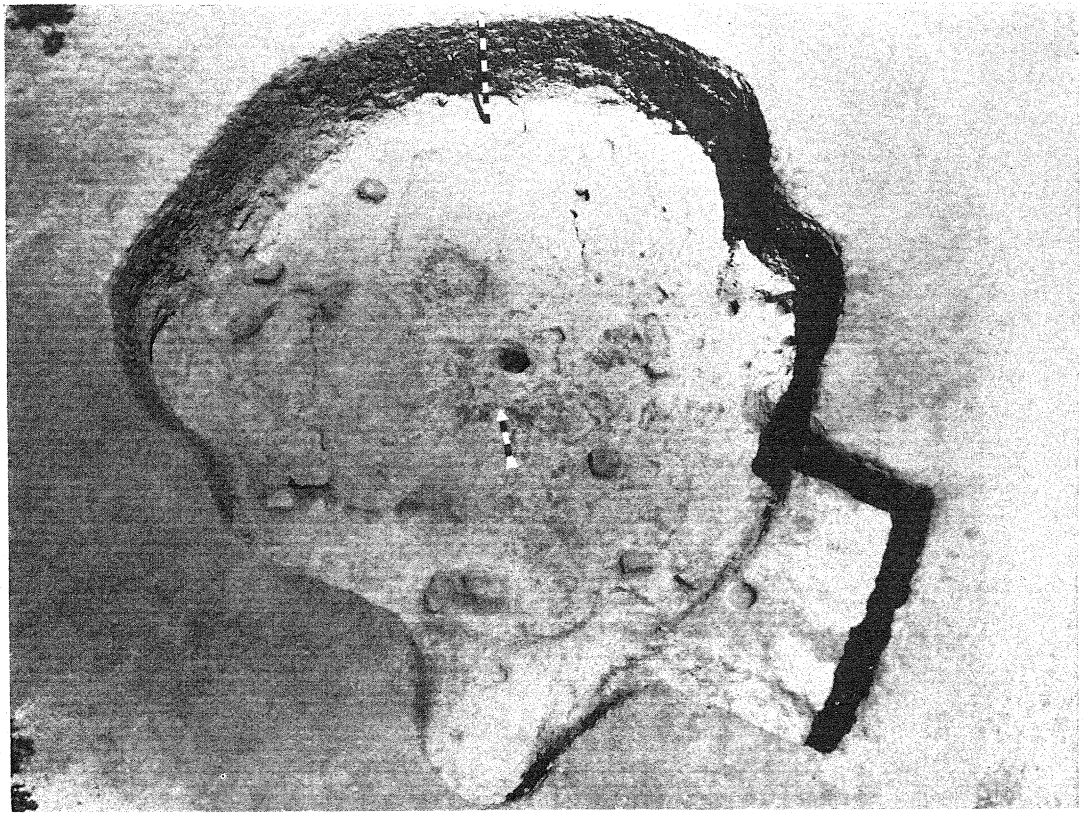


FIG. 48. Pit House H; showing central post-hole, entrance(?) at south, and six small post-holes in niche on east wall. Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE I

(Fig. 49 and Map 16)

Shape.—Elliptical, with pit appended on long axis; greatest diameter (including pits), 6.8 meters.

Walls of unplastered, native earth (sandy clay and hardpan).

Floor of sterile clay; fairly even; 1.2 meters below sod.

Firepit.—None found.

Deflector.—None.

Lateral Entrance.—None found.

Pits.—Seven in number; least diameter, 30 cm.; greatest diameter, 2 meters; of varied sizes, all fairly large; depths range from 20 cm. to 70 cm. See Burials.

Burials.—Burial 30 in pit 1; Burial 32 in pit 7; all burials placed after house was abandoned. No associated objects.

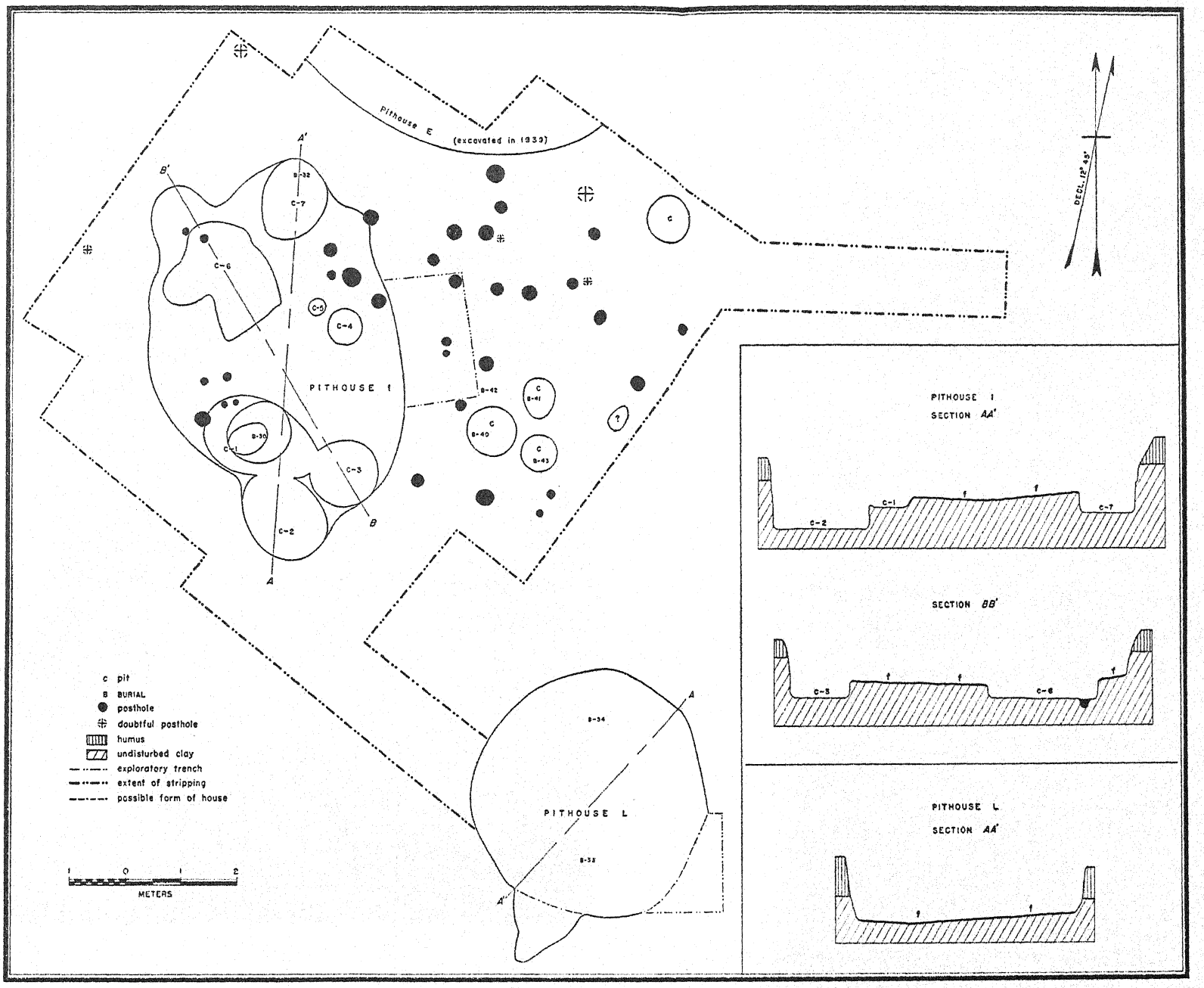
Post-holes.—Eleven in number; diameters, 10 cm. to 30 cm.; average depth, 25 cm. On old ground level outside of house, in stripping operations, at least sixteen more post-holes were found.

Roof.—Exact character unknown.

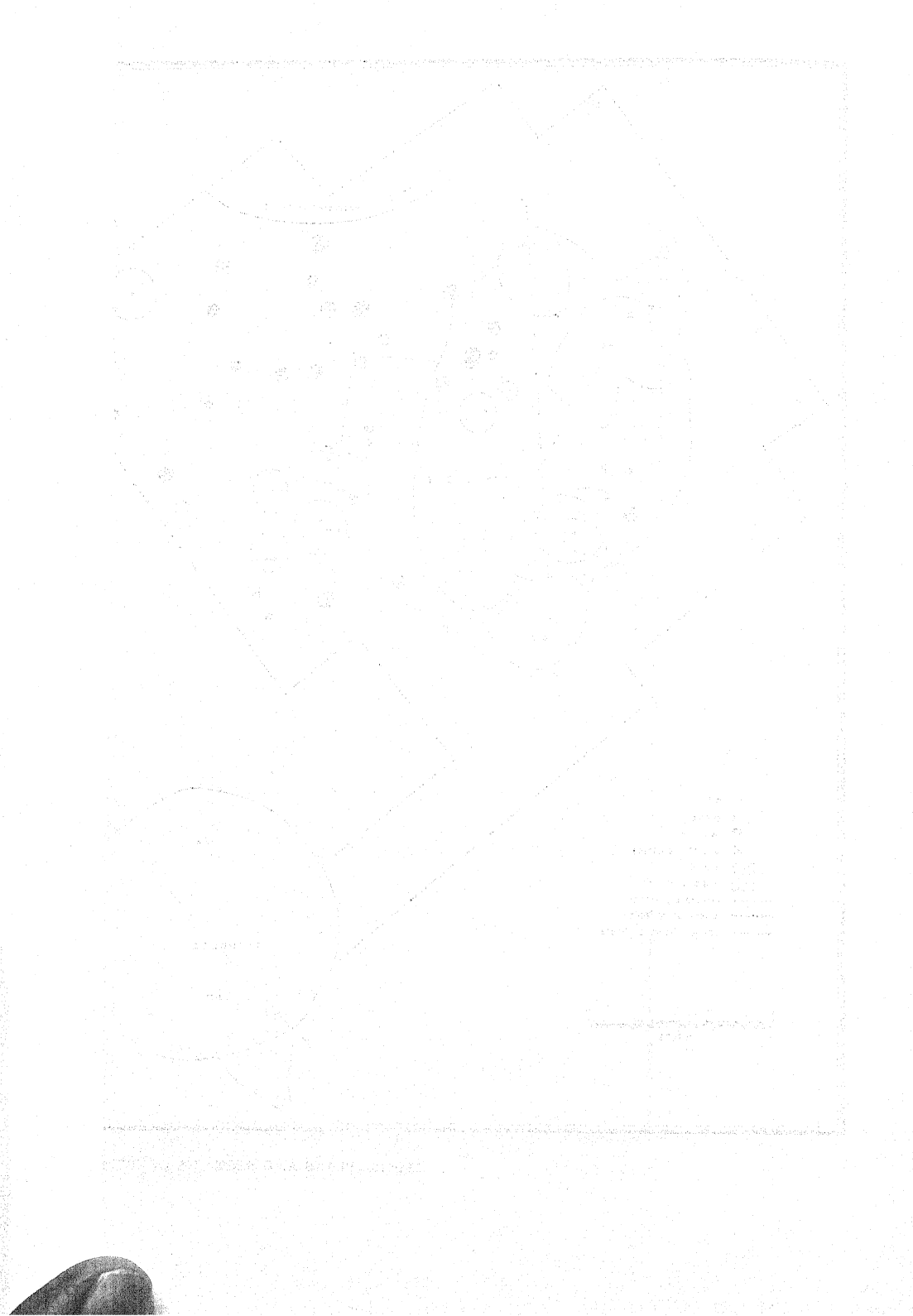
Pottery.—Alma Plain, 51 per cent; Alma Rough, 23 per cent; San Francisco Red, Saliz variety, 26 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Some burned adobe found in east zone, but no evidence that pit house as whole burned. *Stripped zone* extended outward in all directions from pit house walls for a distance of about 2 meters and was carried down to a depth of about 40 cm. below sod line. Stripping revealed sixteen exterior post-holes, and four exterior pits of varying sizes. In pits were found three more burials, numbers 40, 41, and 43; no associated objects. Cache of bone tools found near pit house wall in northwest quadrant.



MAP 16. PLANS AND SECTIONS OF PIT HOUSES I AND L



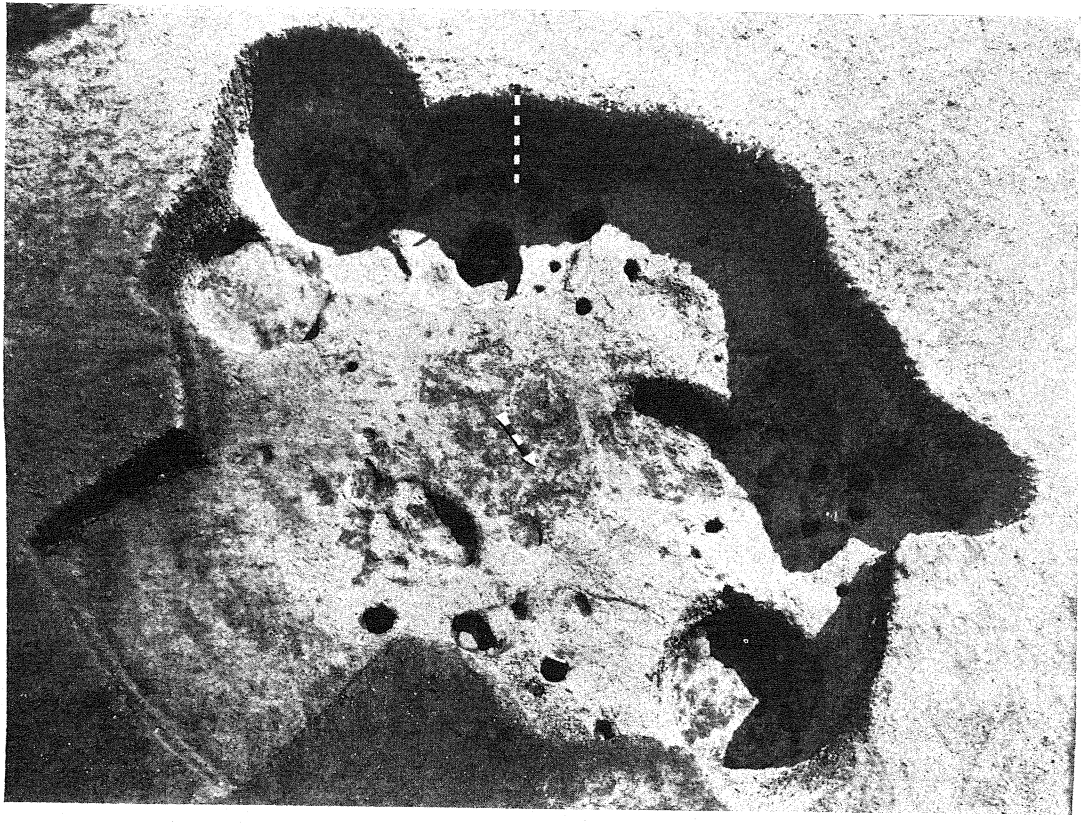


FIG. 49. Pit House I; showing pits and post-holes (trench butt on east). Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE J

(Fig. 50 and Map 17)

Shape.—Circular; greatest diameter, 6.65 meters.

Walls of unplastered native soil.

Floor of sterile, orange-colored, sandy clay; fairly even, depth below sod line, 1.1 meters.

Firepit.—None found.

Deflector.—None.

Grooves.—Just west of entrance are three grooves. Three post-holes near easternmost groove.

Lateral Entrance.—Niche-type on east side of house. Floor slopes upward and outward, and slight step-up between floors of pit house and entrance.

Pits.—Five in number; diameters, 15 cm. to 65 cm.; depths, 10 cm. to 17 cm. Stone mortar found in pit 5.

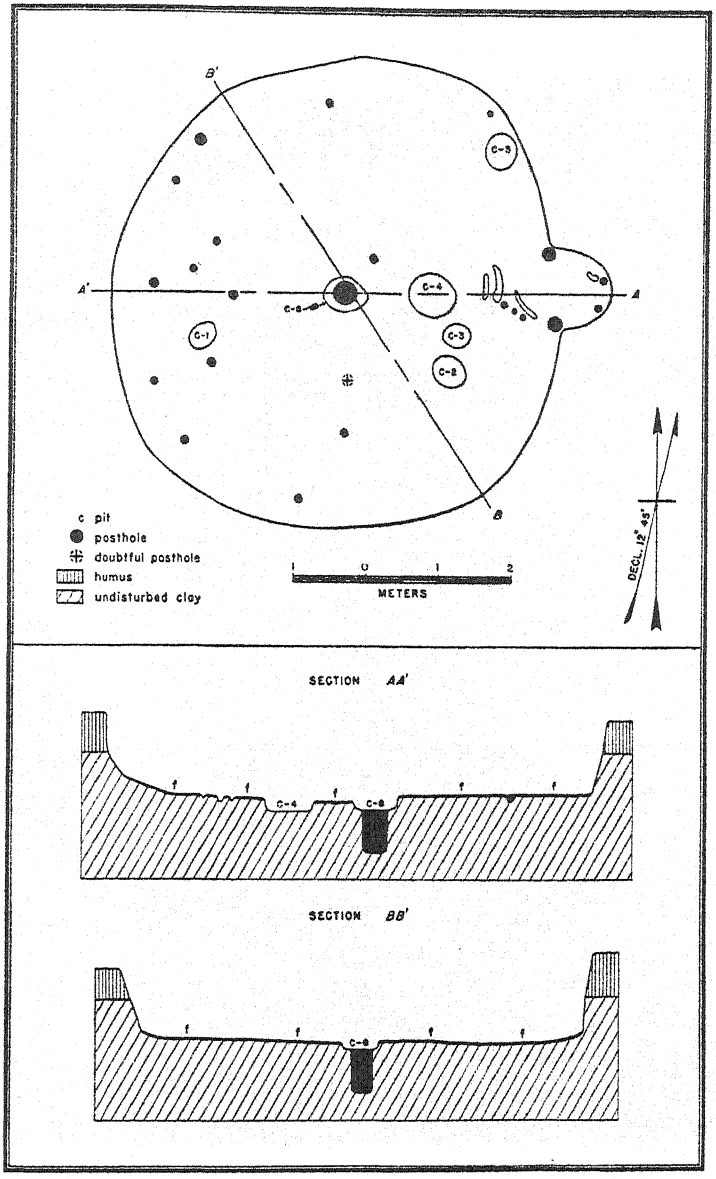
Post-holes.—Twenty-one in number; one large central one (diameter, 60 cm.; depth, 70 cm.). Average diameter of post-holes in outer zones, 12 cm. Average depth of post-holes in outer zones, about 15 cm. Four of these post-holes in entrance, three near easternmost groove.

Roof.—Exact character unknown. May have been umbrella-like, with large central post to which were attached at sloping angle secondary rafters (like ribs of umbrella), butt ends of which were thrust in sod or pit house walls. See Figure 43 for theoretical restoration of roof.

Pottery.—Alma Plain, 61 per cent; Alma Rough, 13 per cent; San Francisco Red, Saliz variety, 26 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Pit House J did not burn. About 100 unworked stones scattered over floor in no apparent order and all resting on about 15 cm. of buff fill. These stones might have been on the roof. If deflector had been present, does this imply a smoke-hole in roof? Large, boulder-type mortar found in entrance. This house most symmetrical, being almost perfectly round and having been most carefully constructed.



MAP 17. PLAN AND SECTIONS OF PIT HOUSE J

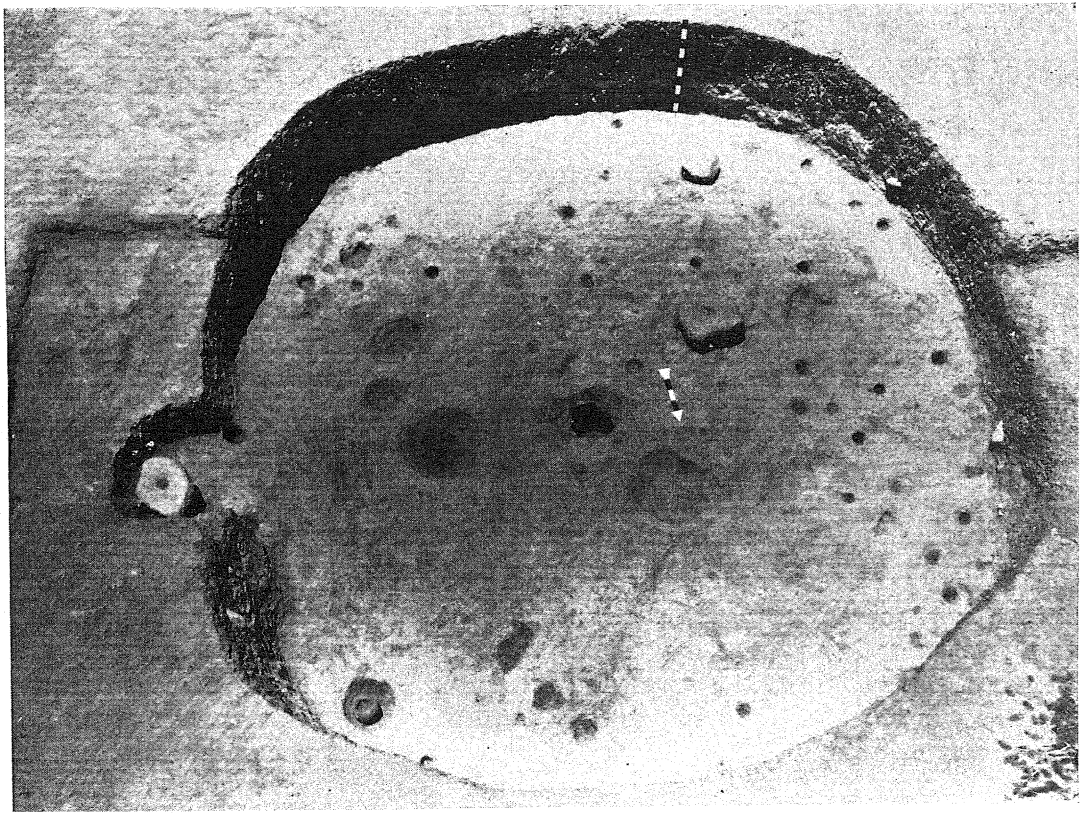


FIG. 50. Pit House J; showing central post-hole, small pits, miscellaneous post-holes and entrance(?) on east. Arrow (50 cm. long) points north; meter stick in background.

SURFACE HOUSE 3

(Originally called K; Fig. 51 and Map 18)

Shape.—Irregular; greatest diameter unknown, but it is guessed to be about 6 meters.

Walls of wattle-and-daub.

Floor of orange, sandy clay with blackened fill above; very uneven; depth ranging from 0 cm. to 40 cm. below sod line.

Firepit.—None found.

Deflector.—None.

Lateral Entrance.—None definitely located, but in northeast zone was found an area of hard-packed fill lying on sterile orange clay. This area had earmarks of a floor. In postulated ground plan herewith given, this area is shown as an entrance.

Pits.—Within stripped zone, twelve in number. Diameters, from 22 cm. to 1.7 meters; depths, from 9 cm. to 93 cm.

Burials.—Burial 27 in pit 5; Burial 28 in pit 3; Burial 29 in pit 4; Burial 31 in pit 7; Burial 35 in pit 6; no associated objects with any of them.

Post-holes.—In entire excavated zone, including stripping (about 10 meters square), 134; of this number approximately 49 belong to postulated wattle-and-daub surface room. Diameters, 10 cm. to 40 cm.; average depth, about 20 cm.

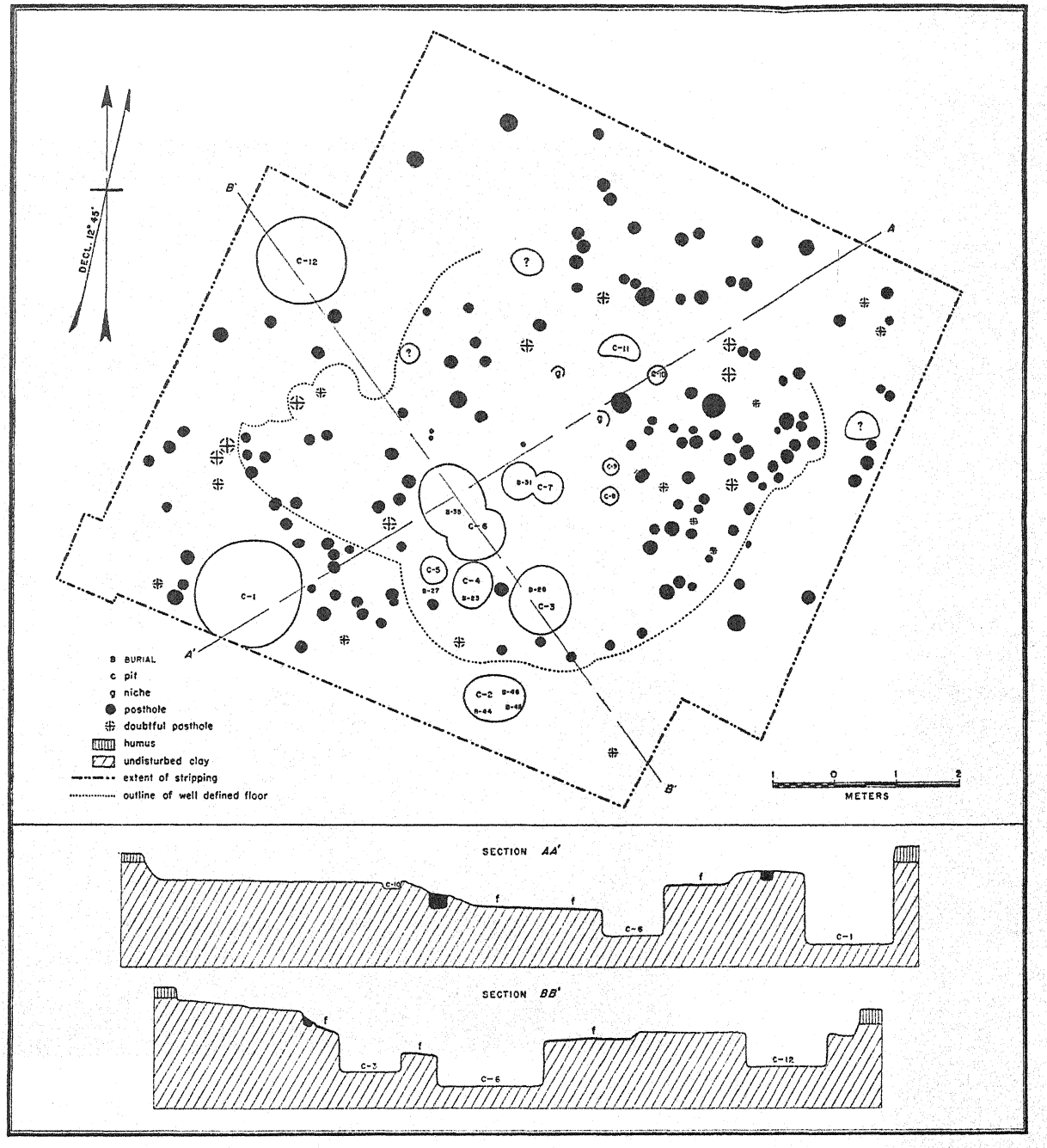
Roof.—Exact character unknown.

Pottery.—Alma Plain, 56.5 per cent; Alma Rough, 17.5 per cent; San Francisco Red, Saliz variety, 26 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—This house is definitely a surface house, as the deepest part of the floor is only a few centimeters below the old ground level. Walls consisted entirely of wattle-and-daub. This is the third such house excavated at SU site—one in 1939, and one described in this report as Surface House 2. Whether or not such a house is older or younger than pit houses is impossible to state. It did not burn.

Such a bewildering number and complexity of post-holes as appeared in our excavation of this stripped zone is difficult to explain. Some of these holes undoubtedly belong to the house. Those that did not may be of varying ages. Possibly some of these holes belonged to other surface structures that we were unable to identify, and some may have been used for loom or skinning frames.



MAP 18. PLAN AND SECTIONS OF SURFACE HOUSE 3 (FORMERLY CALLED K)

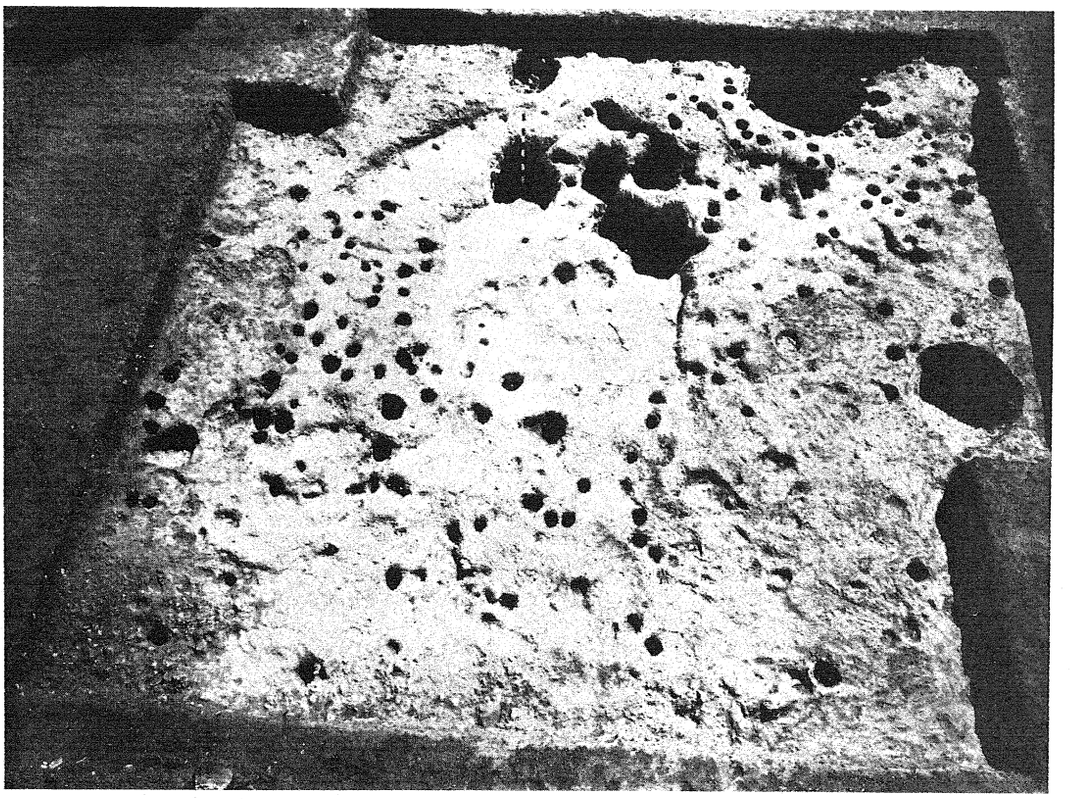


FIG. 51. Surface House 3; showing extent of stripping operation, and large depression in central background, pits, and the unusually large number of post-holes. Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE L

(Fig. 52 and Map 16)

Shape.—Circular; greatest diameter, 4.3 meters.

Walls of unplastered, sandy, orange-colored clay.

Floor of sterile, orange-colored, sandy clay containing patches of fine gravel; fairly even; depth, about one meter below sod line.

Firepit.—None.

Deflector.—None.

Lateral Entrance.—None.

Pits.—None.

Burials.—Black-trash fill containing quantities of sherds, fist-size stones and stone implements occupied the top 55 cm. At base of trash, 2 burials: Burial 33 (south center) and Burial 34 (north center). With latter were found three bone tools and disintegrated pieces of azurite, malachite, limonite, hematite, and magnatite.

Post-holes.—None.

Roof.—Type unknown. Since pit house was so small, beams may have rested directly on sod without needing upright supports.

Pottery.—Alma Plain, 48 per cent; Alma Rough, 22 per cent; San Francisco Red, Saliz variety, 30 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—This house had no distinguishing features. It may not have been finished. However, the house must have been exposed to the elements for some time because about 50 cm. of orange-buff, charcoal-flecked, aeolian- and water-deposited fill containing very few sherds, lay directly on the floor. But chunks of adobe and very black trash rested directly on this more or less sterile orange fill. Apparently upper portion of fill represented trash from nearby houses. No stratification was observed, and no change in pottery types. Therefore, black trash probably does not represent a very long period of time.

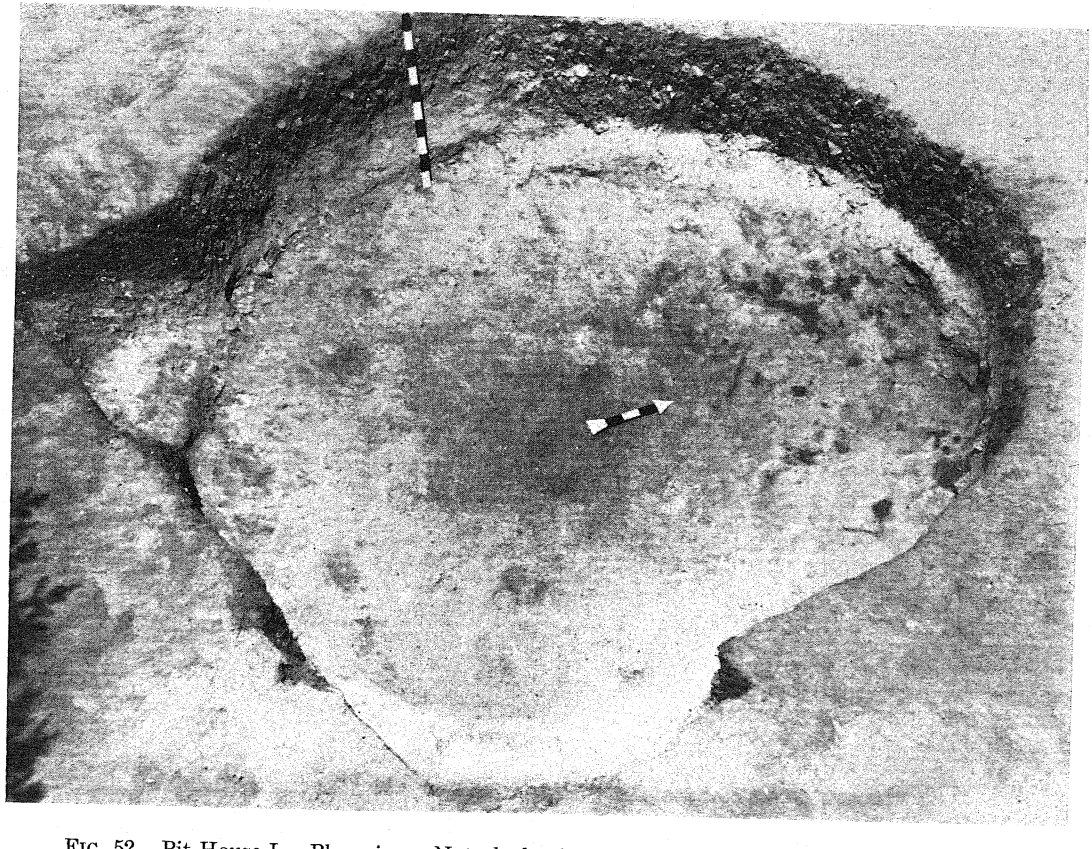


FIG. 52. Pit House L. Plan view. Note lack of any secondary feature (trench butt in left foreground). Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE M

(Fig. 53 and Map 19)

Shape.—Circular; greatest diameter (north and south), 5.75 meters.

Walls of unplastered, orange-colored, sandy clay.

Floor of sterile clay; uneven; greatest depth below sod line, 90 cm.

Firepit.—None.

Deflector.—None.

Lateral Entrance.—None. East portion of wall of house never found, which may account for lack of entrance.

Pits.—Five in number; least diameter, 50 cm.; greatest diameter, 1 meter; least depth, 15 cm.; greatest depth, 60 cm. In pit 1, a basin type metate; in pit 2, fragments of San Francisco Red jar; in pit 3, a burial (see Burials).

Burials.—Flexed burial (No. 36) in pit 3; two stone mortars and two rubbing stones lying near head in burial pit.

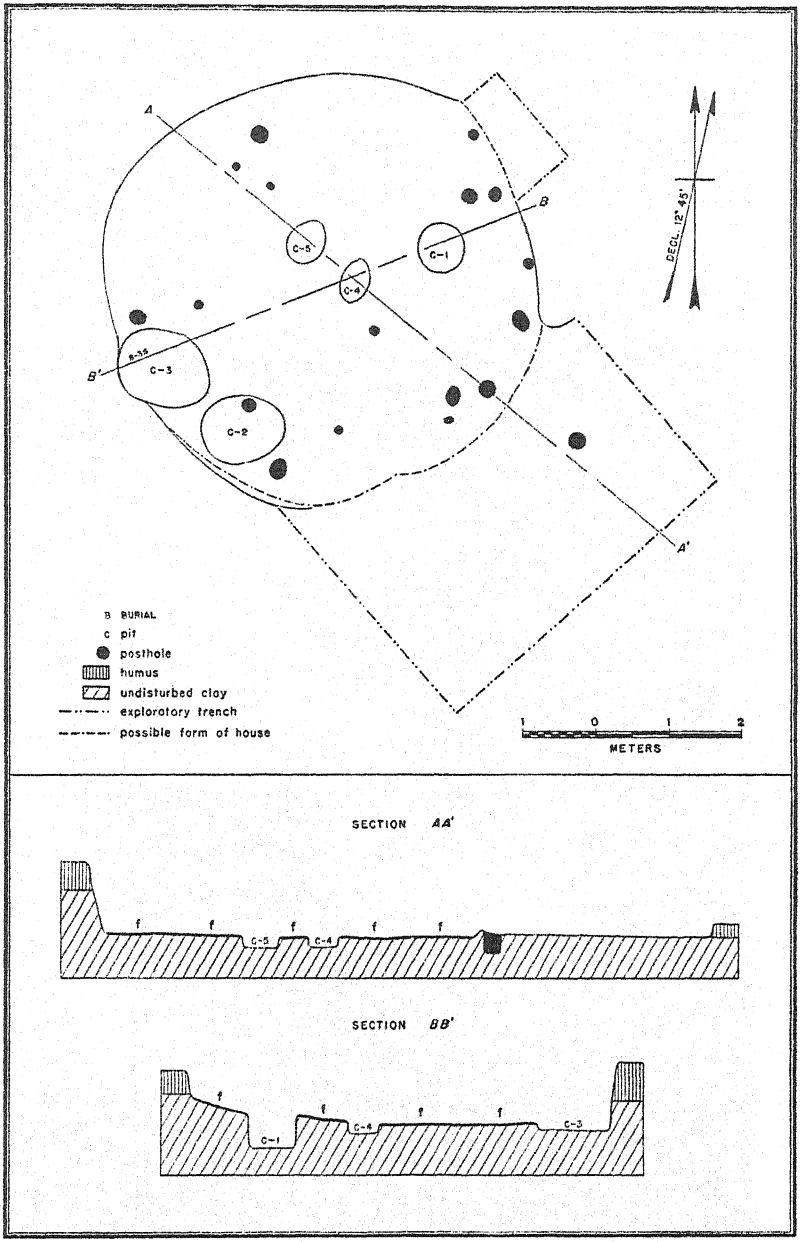
Post-holes.—Seventeen in number; least diameter, 14 cm.; greatest diameter, 25 cm.; depths ranging from 17 cm. to 50 cm. In stripped area east of house, one post-hole found; diameter, 25 cm.; depth, 55 cm.

Roof.—Exact character unknown.

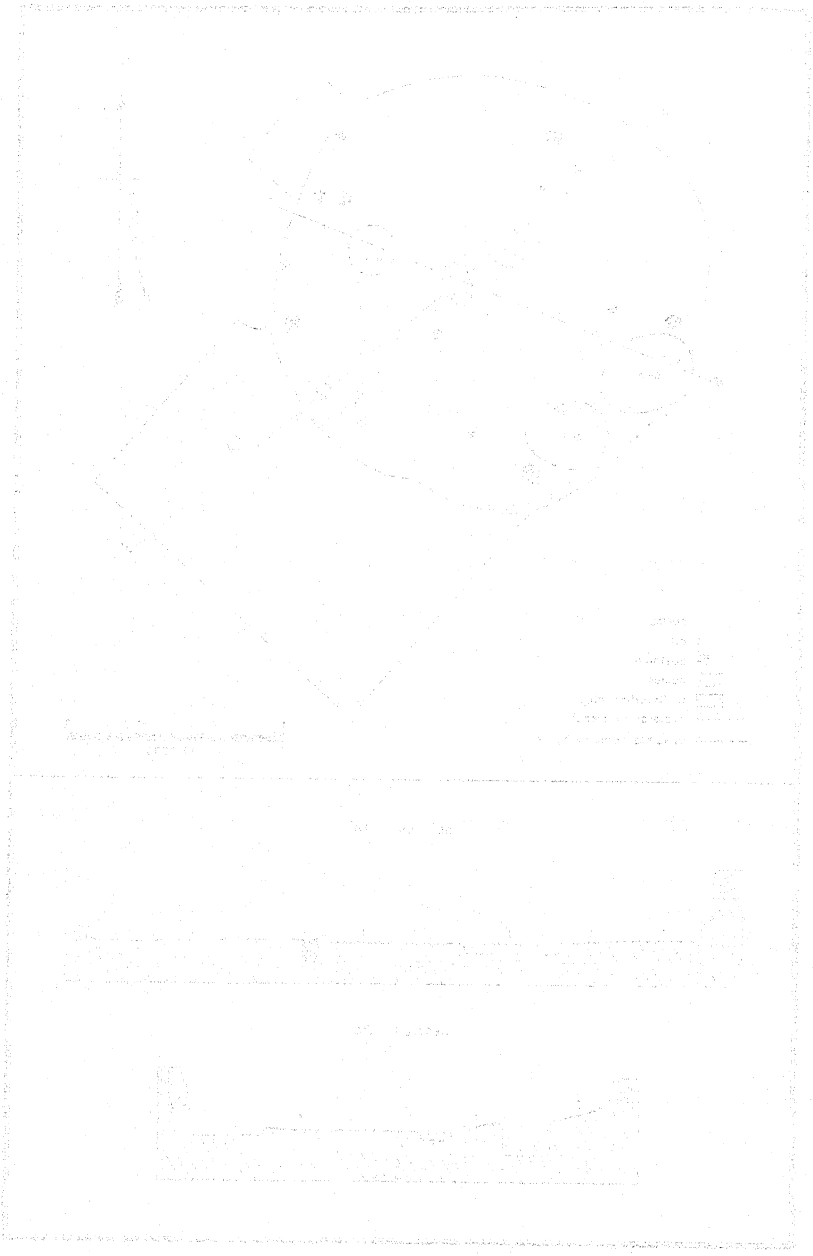
Pottery.—Alma Plain, 65.5 per cent; Alma Rough, 11 per cent; San Francisco Red, Saliz variety, 23.5 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Pit House M did not burn. Wall on southeast side of house was not found. Since ridge sloped abruptly downward here, possibly this portion of house had washed away. Extensive stripping in this area failed to locate any significant features.



Map 19. PLAN AND SECTIONS OF PIT HOUSE M



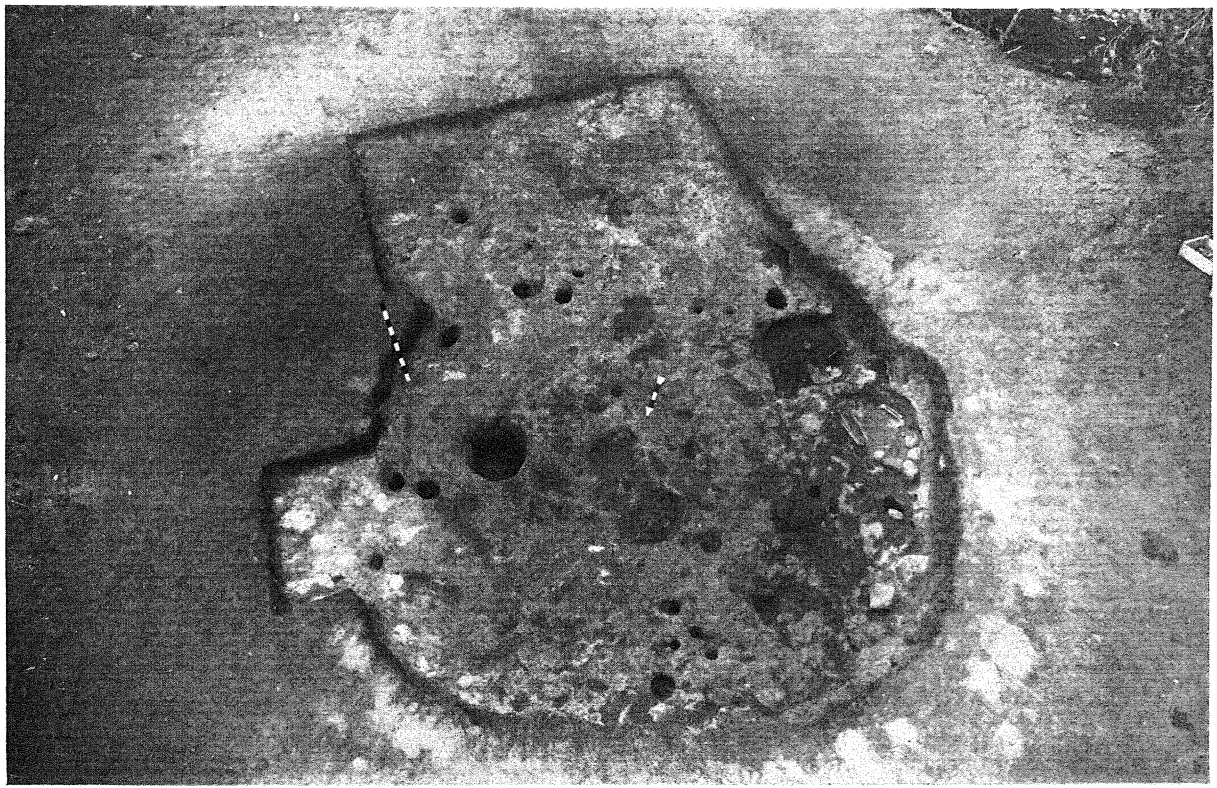


FIG. 53. Pit House M; showing stripping operation in background, trench butt in left foreground, Burial 36, pits, and post-holes. South wall of pit house never found. Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE N

(Fig. 54 and Map 20)

Shape.—More or less round; greatest diameter, 6.15 meters.

Walls of sterile, orange-colored, sandy clay.

Floor of orange-colored, sandy clay; very uneven and partially destroyed by many rodent holes and burrowings; depth below the present sod line, 90 cm.

Firepit.—None found.

Deflector.—None.

Lateral Entrance.—On east side; short, ovaloid appendage to house, with step-up; floor about 25 cm. above pit house floor; two post-holes at extreme eastern edge; pile of stones on south side of entrance.

Pits.—Nine in number; least diameter, 40 cm.; greatest diameter, 2.3 meters; least depth, 12 cm.; greatest depth, 43 cm. Depth measurements are relative, as floor is so uneven. In pit 3, two basin-type metates; in pit 4, two slab-type metates and one hand stone. Pit 4 larger, though not deeper, than any other found on the SU site.

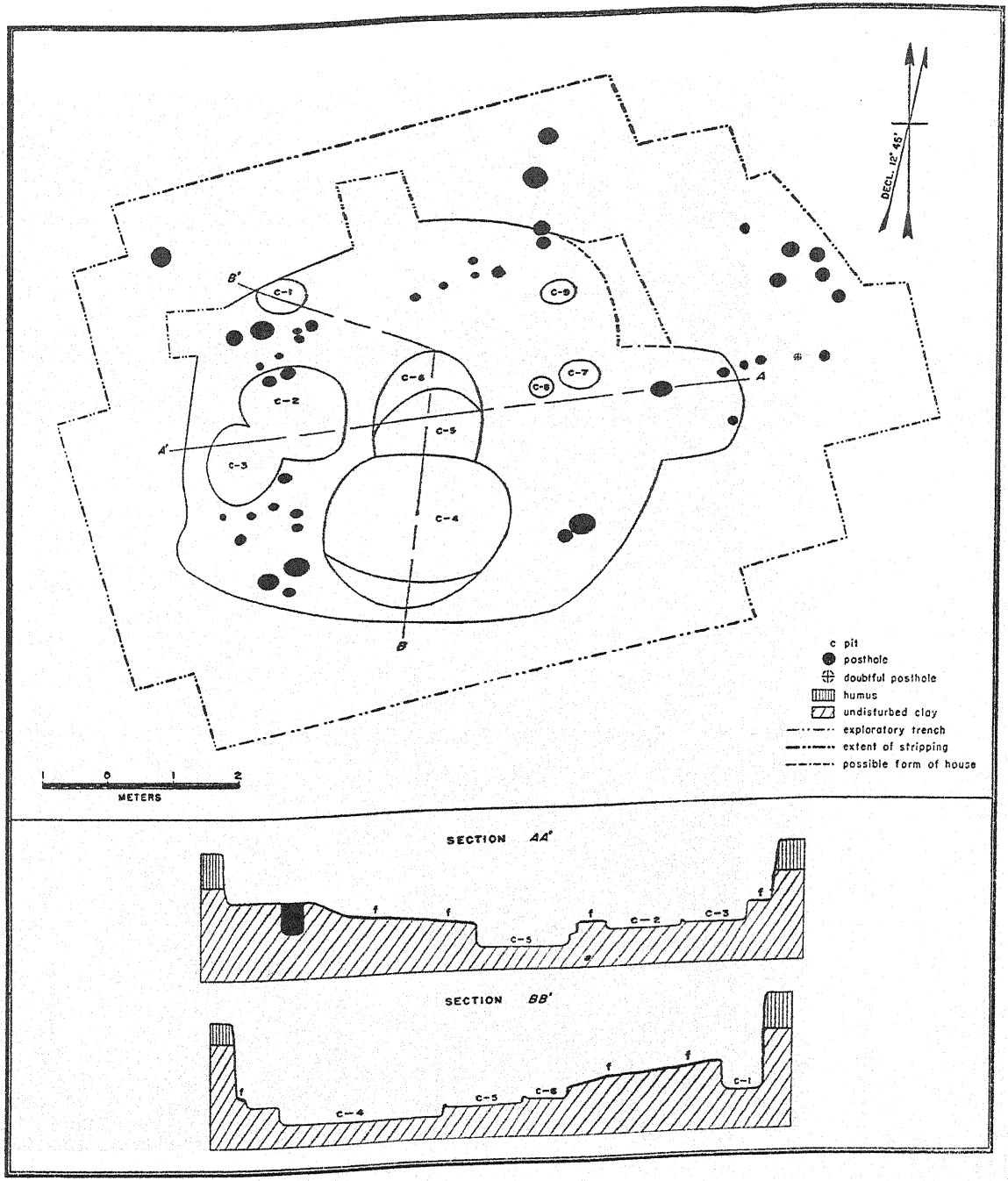
Post-holes.—Twenty-six in number; diameters average about 20 cm.; depth, about 35 cm.

Roof.—Exact character unknown.

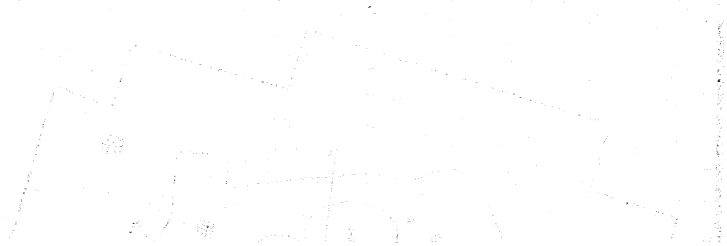
Pottery.—Alma Plain, 74 per cent; Alma Rough, 5 per cent; San Francisco Red, Saliz variety, 21 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Pit House N probably burned, because fragments of burned posts and baked adobe from roof were found on floor. Several mortars, metates, slabs, and hand stones found on floor. Rodent burrowings found in soft fill and throughout floor. *Stripping zone* extended one or 1½ meters outward in all directions and was carried down to depth of 40 cm. below sod line to sterile clay.



MAP 20. PLAN AND SECTIONS OF PIT HOUSE N



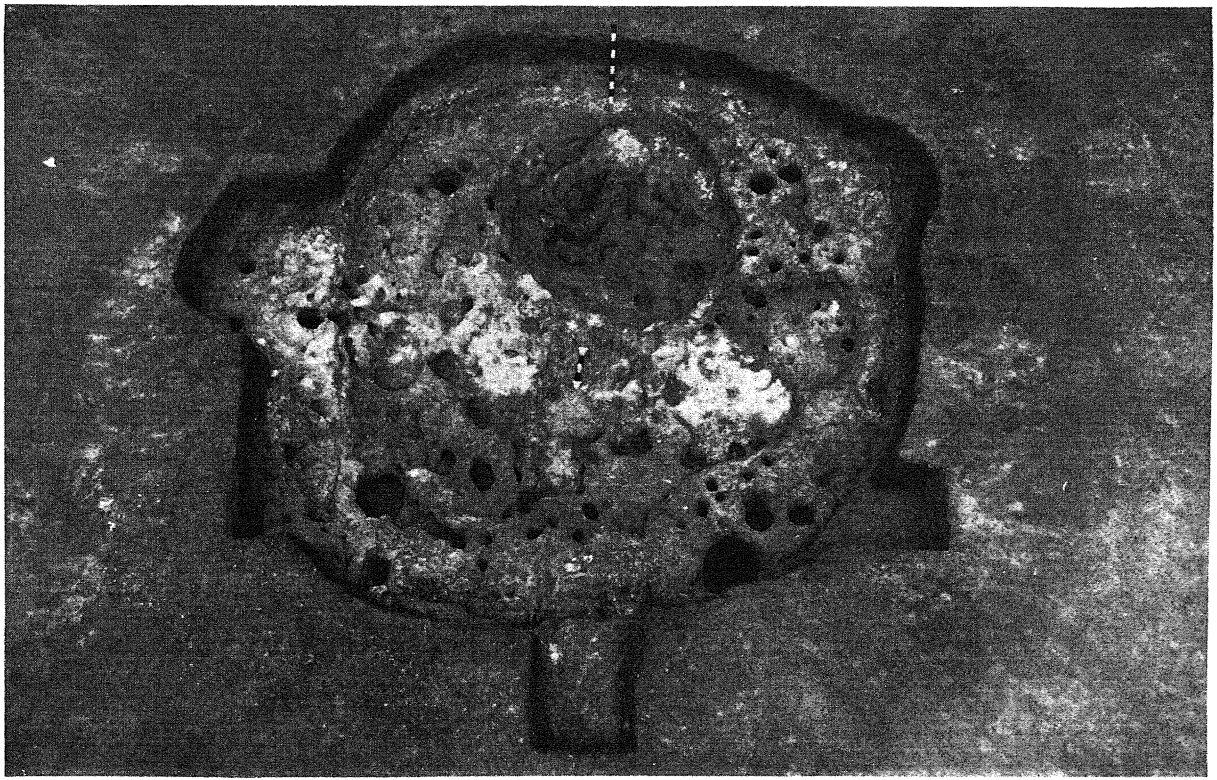


FIG. 54. Pit House N; showing squared-off trench butts on northwest and north of entrance; entrance on east, unusually large pit, lesser pits, and post-holes. Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE O

(Fig. 55 and Map 21)

Shape.—Circular; greatest diameter, 5.5 meters.

Walls of unplastered, orange-colored, sandy clay.

Floor of orange-colored, gravelly hardpan; uneven; depth below present sod line, 80 cm.

Firepit.—None found.

Deflector.—None.

Lateral Entrance.—None.

Pits.—Nine in number; least diameter, 30 cm.; greatest diameter, 1.6 meters; least depth, 10 cm.; greatest depth, 80 cm.

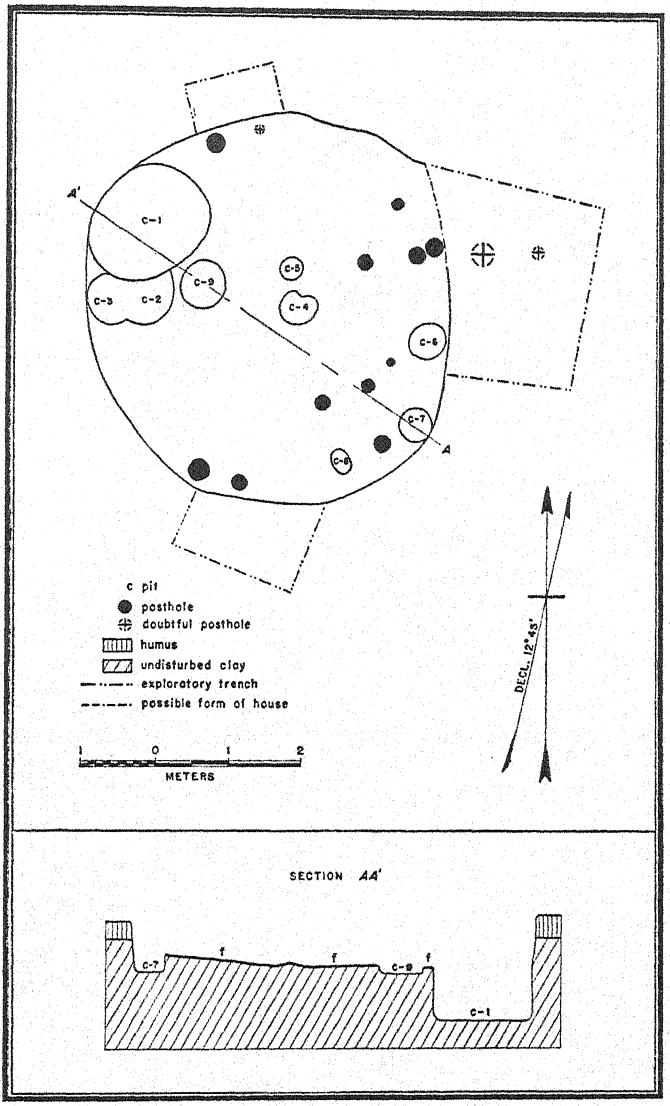
Post-holes.—Eleven in number; least diameter, 10 cm.; greatest diameter, 25 cm.; average depth, about 25 cm.

Roof.—Exact character unknown.

Pottery.—Alma Plain, 53.5 per cent; Alma Rough, 25 per cent; San Francisco Red, Saliz variety, 21.5 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Pit House O did not burn. Several trough-type metates and two manos found on floor.



MAP 21. PLAN AND SECTION OF PIT HOUSE O

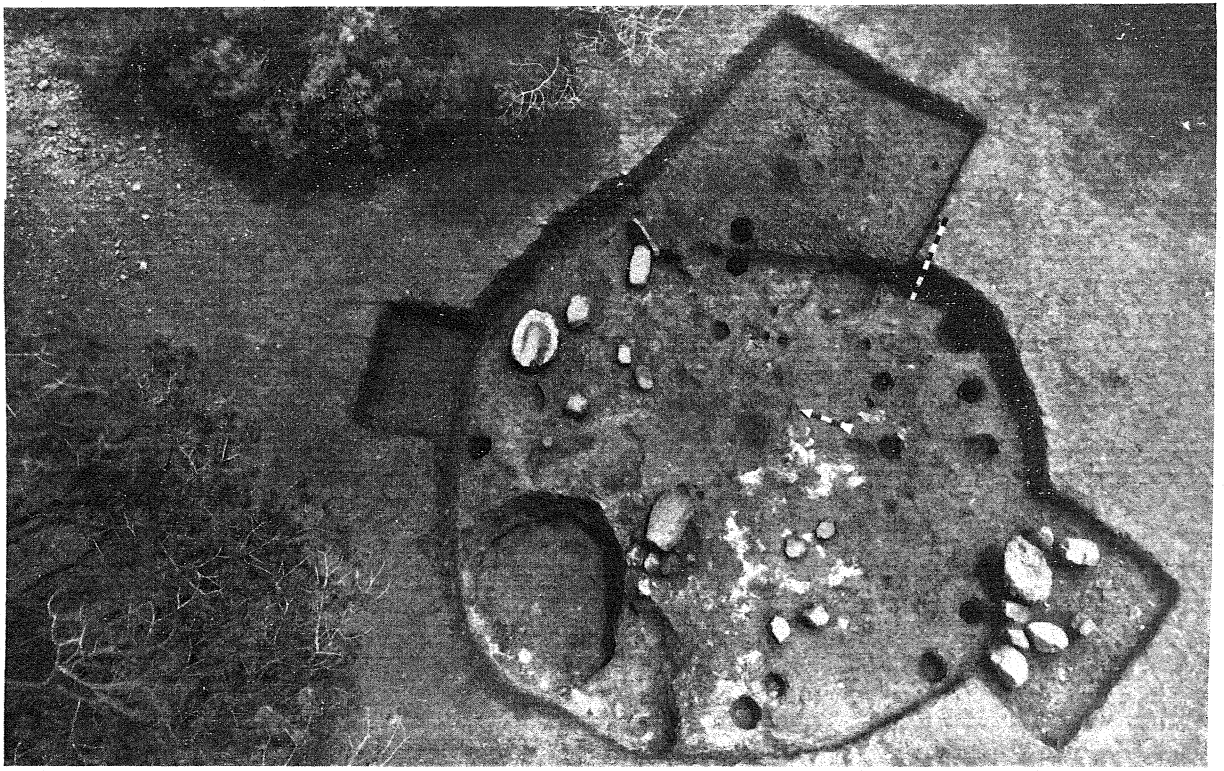


FIG. 55. Pit House O; showing three trench butts, pits, post-holes, metate, miscellaneous stones. Arrow (50 cm. long) points north; meter stick in background.

PIT HOUSE P

(Fig. 56 and Map 22)

Shape.—Ovoid; greatest diameter, 7.25 meters.

Walls of sterile, orange-colored, sandy clay.

Floor of sandy clay with some gravelly hardpan in west zone; fairly even; about 90 cm. below sod line.

Firepit.—None identified.

Deflector.—None.

Lateral Entrance.—On east side, with step-up. Length along central axis, 4.7 meters; greatest width, 3.6 meters; step-up, 12 cm. high; floor rises gradually towards east.

Pits.—Eight in number; diameters, 48 cm. to 2.1 meters; depths, 10 cm. to 1.3 meters. In pit 2 a trough-type metate face down; pit 7, unusually large and undercut. Use of pits unknown. No evidence of fire.

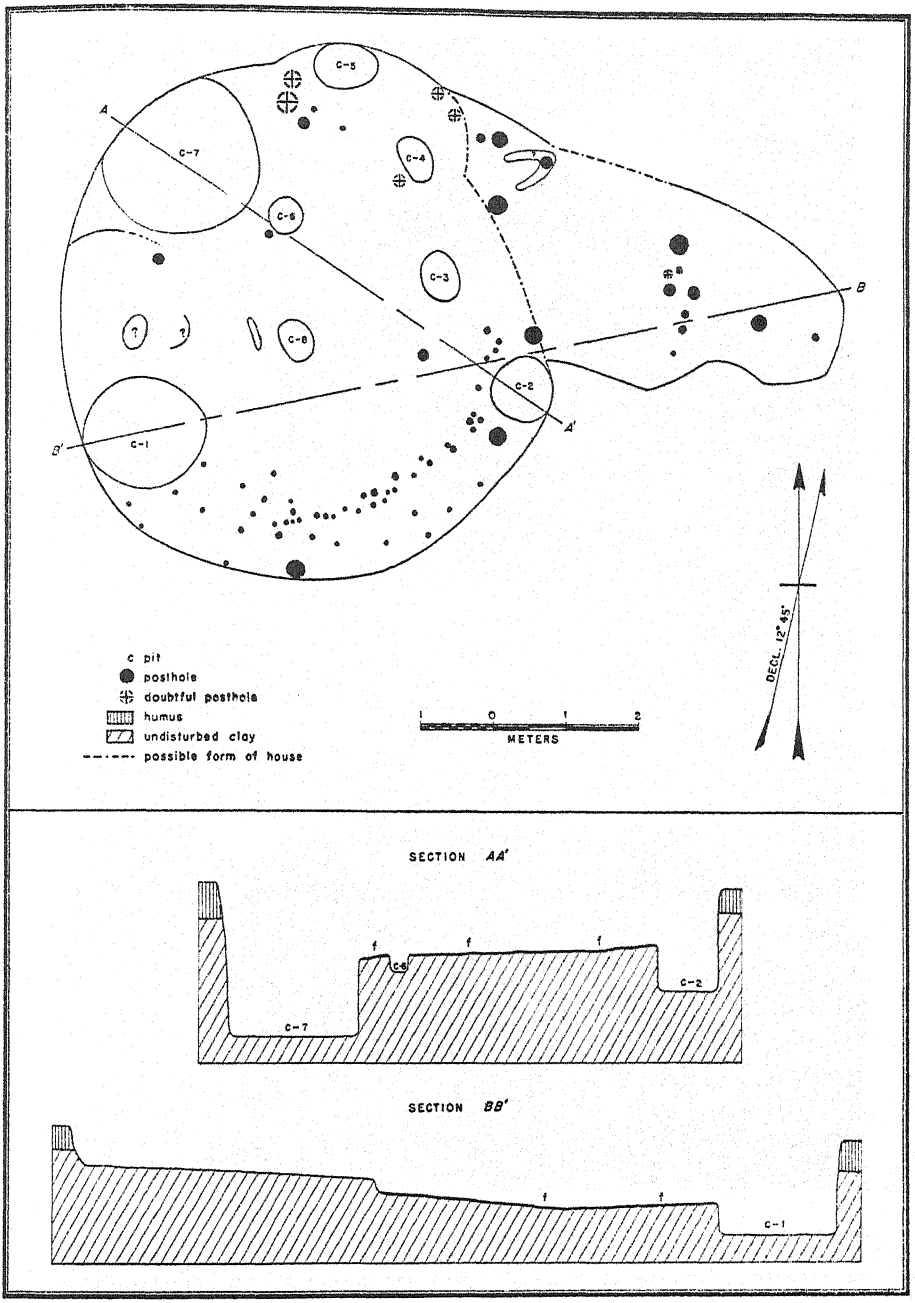
Post-holes.—Seventy-one in number; diameters, 70 mm. to 25.8 cm.; depths, 6 cm. to 40 cm. Note row of post-holes set in semi-circle in southern zone. Charred pieces of wood found in many of them. Significance of this series unknown, although it may have been a secondary wall of some sort.

Roof.—Exact character unknown.

Pottery.—Alma Plain, 48.5 per cent; Alma Rough, 33 per cent; San Francisco Red, Saliz variety, 18.5 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Pit House P may have burned, as we found some reddened adobe from roof and some charred posts. Row of small post-holes in southern zone very unusual feature, although significance unknown. In east end of entrance great mass of unworked stones located. Small, short groove (41 cm. long, 1 cm. wide, and about 1 cm. deep) west of pit 8; use unknown.



MAP 22. PLAN AND SECTIONS OF PIT HOUSE P

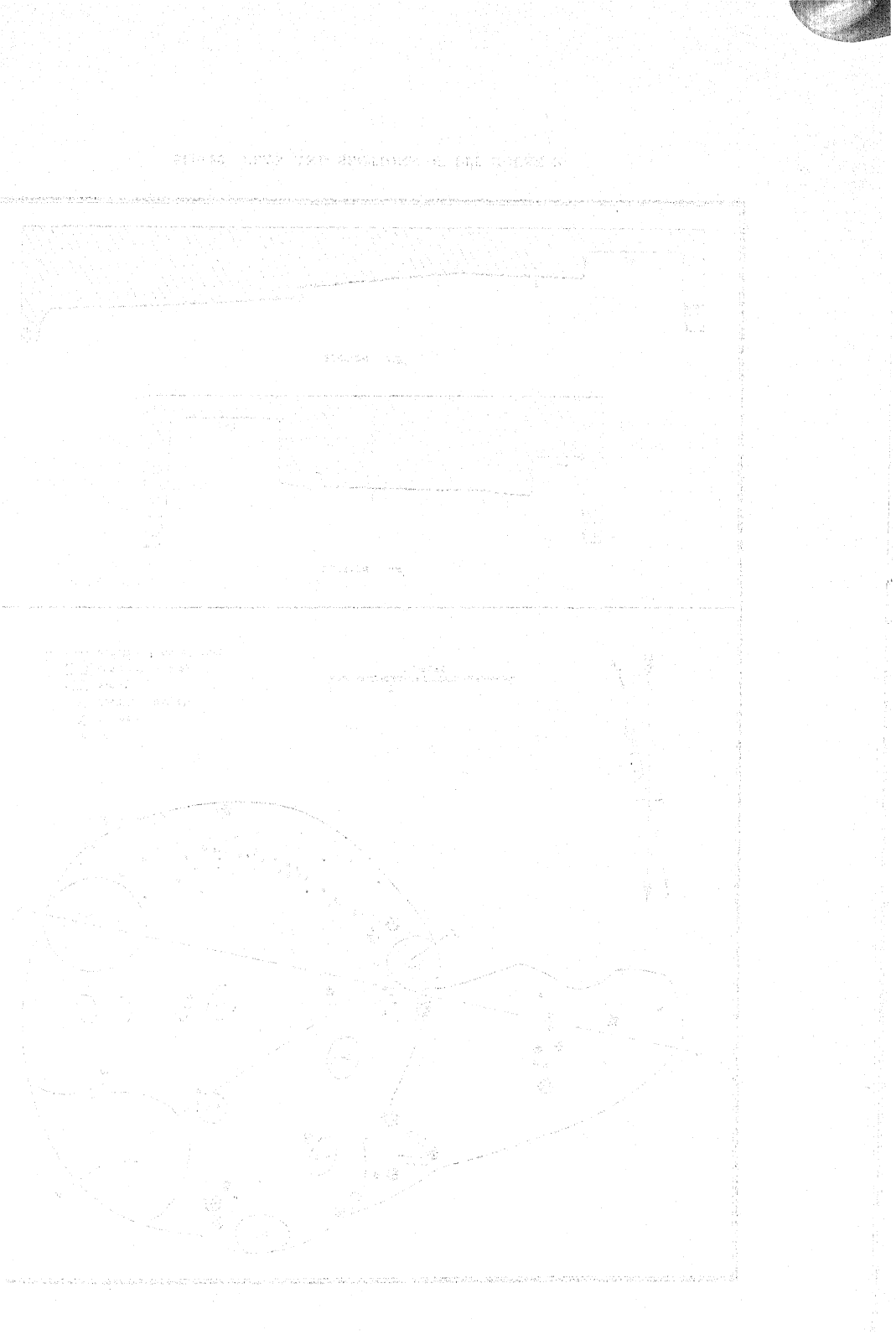


FIG. 56. Pit House P; showing long entrance on east with step-up; exceptionally deep pit, lesser pits, post-holes. Note double line of small post-holes in southwest quadrant. Arrow (50 cm. long) points north; meter stick in background.

SURFACE HOUSE 2

(Fig. 57 and Map 23)

Shape.—More or less circular; exact size unknown; diameter probably about 5 meters.

Walls.—Probably wattle-and-daub.

Floor.—Gravel and sterile, orange-colored clay; very uneven; depth below sod line, about 20 cm.

Firepit.—None identified.

Deflector.—None.

Lateral Entrance.—None.

Pits.—Four in number; diameters, 1 to 1.2 meters; depths, 50 cm. to 1.6 meters. Pit 2 very deep and undercut. No evidence of fire.

Burials.—Burial 38 in pit 1; Burials 37 and 39 in pit 4; no associated objects with any of them; burials placed after house was abandoned.

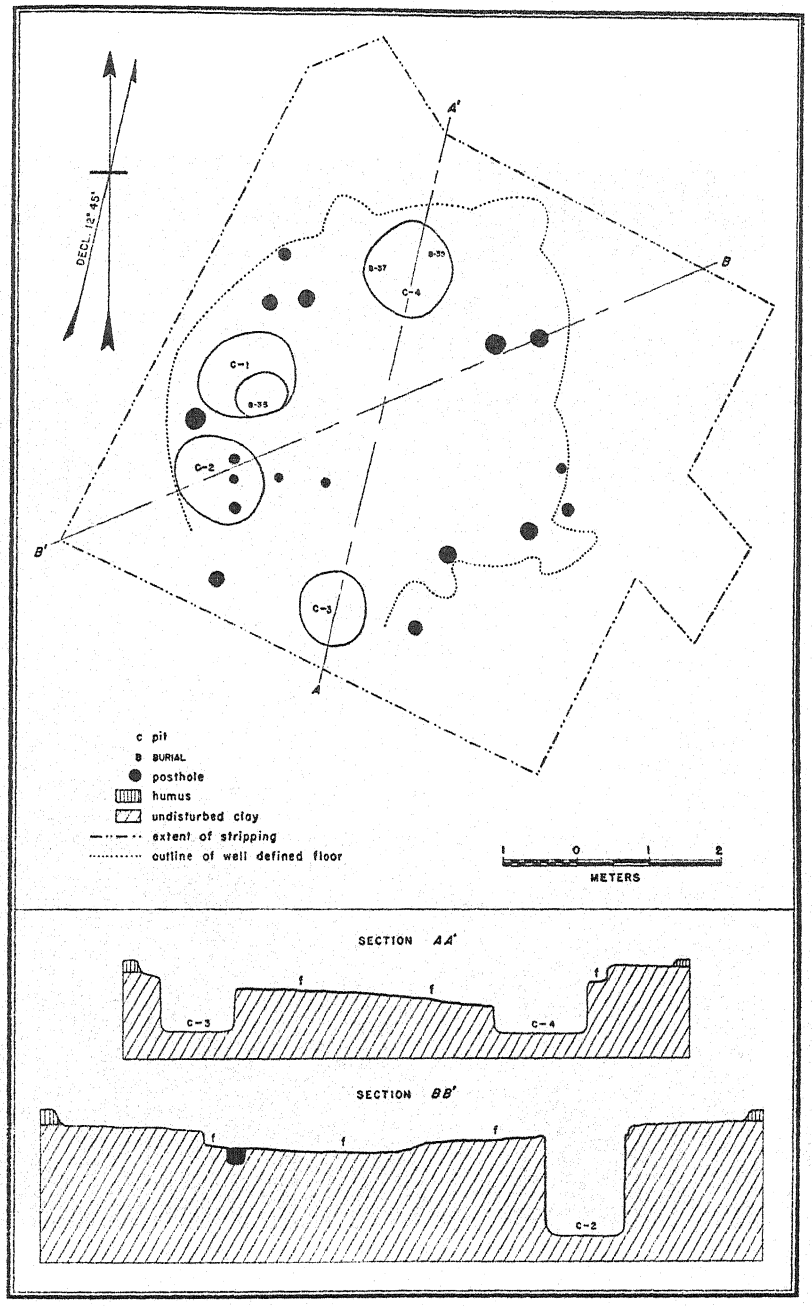
Post-holes.—Seventeen in number; diameters, 12 cm. to 25 cm.; depths average about 25 cm.

Roof.—Exact character unknown.

Pottery.—Alma Plain, 52 per cent; Alma Rough, 26 per cent; San Francisco Red, Saliz variety, 22 per cent.

Phase.—Pine Lawn (Pre-Georgetown).

General Comments.—Surface House 2 did not burn. To be certain no features pertaining to this house were missed, *stripping zone* was extended out from a fairly well-defined hard-packed floor for a distance of approximately a meter in all directions. Nothing significant was found in this stripped zone. Floor was not sunk below old ground level.



MAP 23. PLAN AND SECTIONS OF SURFACE HOUSE 2

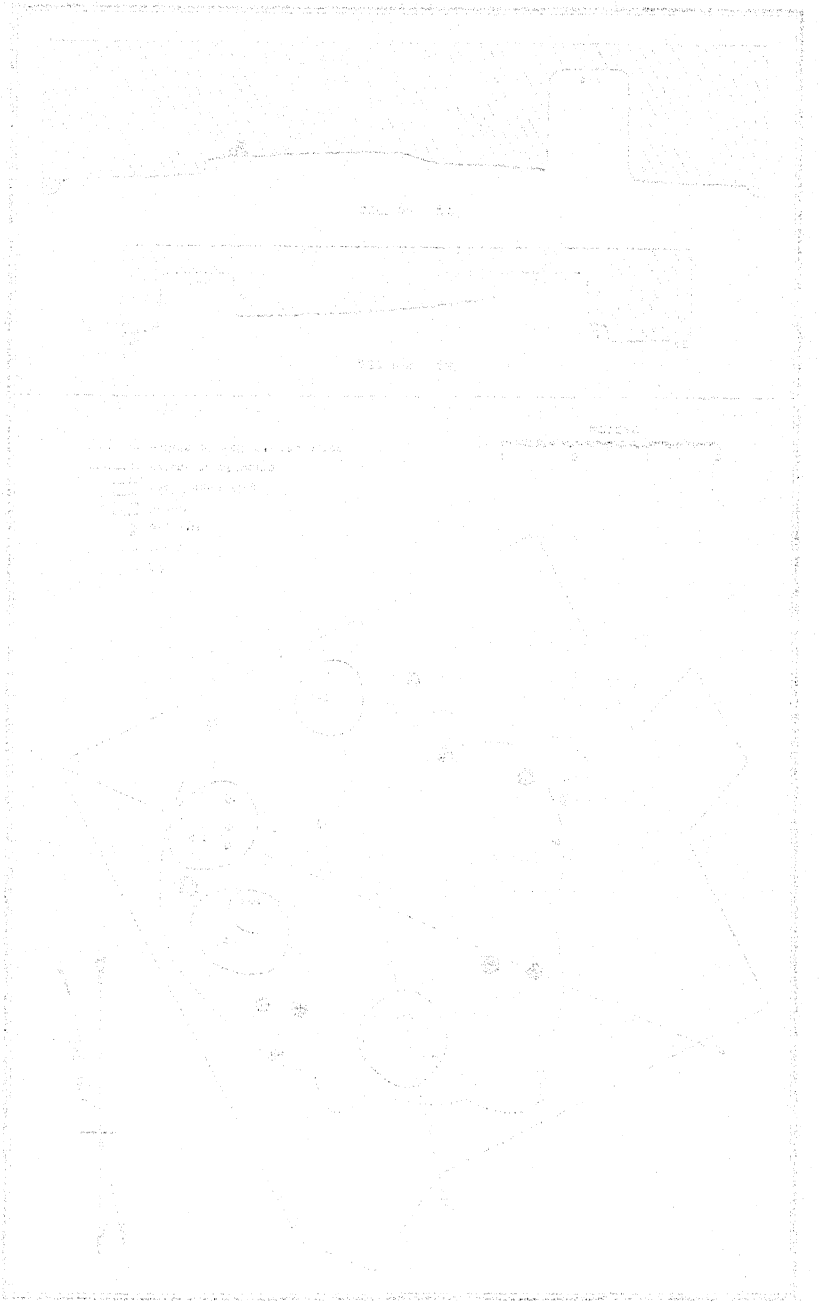


FIG. 57. Surface House 2; showing extent of stripping, pits, and post-holes. Arrow (50 cm. long) points north; meter stick in background.

FEATURES OUTSIDE OF HOUSES

(Map 14)

Trenches.—Twenty-three were dug in season of 1941; labeled as TT (test trench); in ten of these trenches, houses were discovered; and in two, pits. Trenches averaged 1 meter in width, although some were wider; 60 cm. in depth (hardpan). Floor of trench always carried through humus, gumbo, oxidized-leached clay, down to fresh layer (hardpan). Purpose of trenches was to locate only man-made features not superficially apparent (some pit houses are indicated by slight crater-shaped depression).

Pits.—Two were found outside houses; outside-pit number 4 found in TT 9; number 5, in TT 26.—*Pit 4:* Diameter, 1.74 meters; depth, 95 cm. below sod line. Floor of fine-pebbled hardpan. Slightly undercut. No roof indications. No evidence of fire. Purpose unknown.—*Pit 5:* Diameter, 1.25 meters; depth, 1.35 meters below sod line. Floor of hardpan. Walls vertical. No indications of roof; no evidence of fire. Purpose unknown.

Stripping is removing all top soil, gumbo, and clay down to sterile, undisturbed layer; carried out in vicinity of pit houses H, I, K, L, M, N. A slow technique but worthwhile. Undertaken for purpose of locating: (1) Old ground level (this was not very successfully located); (2) outdoor fire or cooking pits (none found); (3) post-holes for roof supports which might lie outside houses (post-holes were found especially around Surface House 3; but no satisfactory evidence was obtained for helping solve how houses were roofed). Several burials (Nos. 40–44) and one or two stone artifacts were encountered in stripping.

Soil Test Pit (TT 31) excavated at crest of ridge in unoccupied sterile zone to obtain undisturbed profile of soil conditions. The section from top to bottom was as follows: 10 cm. of humus; 20 cm. of gumbo; 30 cm. of oxidized and leached clay; fresh (bottom of excavation).

V. ARTIFACTS

BY

JOHN RINALDO[1]

On pages 181–235 the details of the artifacts are given in outline form. For convenience in comparison the artifacts have been grouped as follows:

Object	Number excavated
Ground and Pecked Stone	
Hand stones	
Manos	84
Rubbing stones	53
Milling stones	
Metates	34
Small metate-like grinding stones	23
Mortars	28
Pestles	48
Polishing stones	92
Hammer stones	45
Mauls	23
Pitted pebbles or stones	10
Stone bowls or dishes	8
Paint grinding stones	9
Pipes	8
Chipped Stone	
Projectile points	43
Knives	49
Scrapers	96
Choppers	12
Drills	3
Pot cover	1
Hoes	3
Polished Stone	
Pendants	3
Beads	1
Shell	
Beads	69
Bone	
Disk	1
Flakers	3
Needles	6
Awls	29
End scraper	1
Pipe stem	1
Clay	
Worked sherds	96
Pipe	1
Figurines(?)	2
Miniature ladles	10

[1] Written in collaboration with Jane Darrow.

Object	Number excavated
Unworked Stone	
Pigments	9
Crystals	7
Petrified wood	1
Obsidian nodules	2
Total number of artifacts	914

One of the primary interests in the study of the material found at the SU site is the inquiry into how the Mogollon people made their living at this stage in their cultural development. This inquiry has four main aspects in the evidence afforded by the artifacts. These aspects are: (1) Methods of working tools; (2) their functions; (3) their relation to food-gathering; and (4) comparison of these tools with artifacts from other horizons.

1. METHODS OF WORKING TOOLS

GROUND AND PECKED

Following the above outline, we first investigated the marks on the artifacts made in the process of their manufacture. For example, characteristic pits, striations, and smooth surfaces on some implements indicate that they were modified by pecking and grinding. All the implements that show some modification of this nature are listed under the heading "ground and pecked stone." However, some of these implements show more of this kind of modification than others. The majority of specimens of manos, rubbing stones, and metates with single grinding surfaces show little modification of the natural stone previous to use. In these implements it appears that certain shapes and sizes of stones were selected according to their suitability to the use intended, and that aside from pecking the grinding surface to roughen it, they were unmodified before actual use. Exceptions to this generalization are the manos and rubbing stones with two grinding surfaces which show shaping by pecking on both surfaces and edges. On the other hand, mortars and pestles are like the majority of manos in the extent to which they were modified. The cavities (or depressions) of the mortars and stone vessels were made in naturally rough, roundish pebbles; the exterior of these implements shows no preliminary modification. The pestles show shaping only on the surfaces used for crushing or grinding. The remainder of the stone was not modified.

Some artifacts reveal no preliminary modification whatsoever. For example, polishing stones show no modified natural surfaces

other than the facets produced by use. To a similar degree a graded series of hammer stones indicates that when fresh they were merely natural sharp angular cores, which later became round through use. In fact, the full-grooved mauls are the only kind of ground and pecked stone implements which consistently show that the majority of their natural surfaces were modified before they were used.

CHIPPED IMPLEMENTS

Chipped stone implements show scarcely more than preliminary shaping. For example, the majority of knives and scrapers from the site are merely random flakes that were selected as suitable for cutting and scraping. The only successive modification which most of these show is the secondary chipping along the edges done to sharpen them, or a little chipping that resulted from use. Other implements show proportionately more chipping. Choppers, for example, show sharpening to an edge by heavy percussion blows; but they also frequently have a portion of the "crust" of the original core left intact to serve as a smooth surface to grasp in the hand. As usual, all the projectile points, knife blades, and drills show secondary chipping on all major surfaces, although the quality of workmanship shows a wide range from the finest of pressure chipping to some which may possibly be percussion chipping. On the other hand, the hoes and the single pot cover are more like the mortars in the degree to which they were shaped. These hoes were fashioned from fairly smooth natural plates of stone and are shaped only in outline by chipping. It seems probable that the bone flakers and the hammer stones found on the site were used for chipping these implements.

STONE ORNAMENTS AND PIPES

Still more care in workmanship appears to have been taken with the few stone ornaments and the pipes found. These tend to be smooth and well-finished specimens when completed, although the unfinished pipes are rather rough. Specimens such as the zoomorphic figurine even show delicate workmanship in the carving of features, and reveal that the former inhabitants of the SU site had a standard of workmanship not revealed by the average implement.

SHELL

The only process of shaping used on the shell artifacts from the 1941 season appears to have been cutting, inasmuch as the natural holes in the shell were used for stringing the finished beads. On

the other hand, bracelets found during the preceding season at the same site appear to have been ground down to shape.

BONE

The bone implements and other pieces of worked bone show scratches, striations, and smooth surfaces indicative of cutting with a sharp blade, sawing with a rough edge, grinding, and polishing. In the process of making awls, the long bones appear to have been split and cut down to a rough shape with implements such as the choppers and knives, and then ground and polished with abrasive stones such as sandstone or quartzite. Abrasive stones that might have been used for this purpose were found during the previous season. The drilled holes in the needles are too small to have been drilled with only stone drills such as were found on the site. However, these holes were possibly started with the stone drill and finished by using thorns, water, and sand, as Haury (1931, pp. 80–87) has suggested.

CLAY ARTIFACTS

The clay artifacts were apparently modeled from wet clays such as are found in many of the pit houses. Clay taken from the site and fired experimentally has a superficial resemblance to that used for the implements, in color, paste, and texture. These clay objects show modeling with the fingers; and some such implement as a straw or twig was used to model the holes found in the clay pipes. One ladle fragment and the pipe appear to have been lightly polished with a polishing stone. The worked sherds were made by rubbing the edge of one sherd against the edge of another, thus grinding both down to the desired shape in outline.

MANOS AND METATES

Many of the artifacts show marks resulting from use: irregular pits, rough and beveled surfaces, facets, striations, and the like. Striations and smooth polished surfaces are the most common marks of use on the manos and metates. The circular pattern of the striations and the distinctly oval shape of the smoothed surface on a number of the basin-type metates indicate that the manos were used with a rotary motion on these implements. The manos that fit best with these basin-type metates have convex or slightly convex grinding surfaces either roughened by pecking or ground smooth. The manos associated with these metates have relatively flat grinding surfaces. The trough metates, on the other hand, usually have

striations that run lengthwise of the trough, indicating that the manos were used with a forward and backward motion over this surface. The manos that fit best with these trough-type metates have grinding surfaces that are convex lengthwise and only slightly convex crosswise. The striations on these manos run across the shorter dimension.

PESTLES, MAULS, HAMMER STONES

Other artifacts such as pestles, mauls, hammer stones, and mortars show the tiny irregular broken pits and rough surfaces that ordinarily result from hammer-like blows of stone on stone. Moreover, the working ends of the pestles are worn round and the depressions of the mortars are worn concave.

POLISHING STONES

The polishing stones could be distinguished from other polished pebbles in the fill, only by their polished facets. These facets frequently comprise all of one surface of the stone. Hoes are also marked by smooth used surfaces. These specimens are characterized by their smooth surfaces at one end, as contrasted with the other edges, which are rough from chipping the natural stone to shape.

2. FUNCTIONS OF ARTIFACTS

The use of pipes is indicated by their contents and by occasional smoke-blackened interiors.

The flakers greatly resemble bone awls, but they are distinguished by their tips, which show angular beveled facets. The single end scraper found also shows a characteristic bevel, but of a different kind than that found on the flakers. This bevel is smoother, more rounded, and less angular. The only sign of use on the awls is the high polish of their tips, suggestive of their use in punching holes in leather and fabrics.

A few sets of implements were found which by their association *in situ* lend further credence to the uses suggested by marks of use and by analogy with the uses of similar tools by historic peoples. These were the association of manos with metates in Pit House N, and Surface House 3 mortars with pestles in Pit House J, and two caches of bone tools, consisting of awls and needles, found in Pit House I. It seems from these associations that the former tools were used together in milling, the latter in simple weaving or in making clothing.

Of interest in relation to the uses of metates and mortars is their position within the houses. These larger stone artifacts were left in position until the excavation of each house was well along or almost completed. Although it was found that there was no fixed regularity in the position of these artifacts, it was observed that there was a tendency to place the large mortars and basin-type metates with secondary depression towards the entrance, or in the entrance to the house, whereas the other metates were frequently placed farther back in the house, in or on the edges of shallow pits. It was also observed from their position in place that the desired slope of the metate trough was obtained either by sloping the trough within the block of which it was manufactured, or by making the metate of a block in which the upper (grinding) surface inclined at an angle to the plane of the lower surface. Metates were not propped at an angle by placing small stones underneath, as has been observed elsewhere.

There were a number of artifacts found which bear marks of use indicating that they had more than one function. For example, rubbing stones occasionally have battered ends indicating that they may have been used as pestles or hammer stones; and the multi-face pestles sometimes have polished or striated surfaces which indicate that they may have been used for grinding. Furthermore, certain large manos have flat grinding surfaces striated lengthwise, which might indicate that they were used as small metates in conjunction with smaller manos. In a few other cases it was difficult to determine from the general shape and feature of certain implements whether they were used in one function or another. This was particularly true of large oval polishing stones which it was difficult to distinguish from small oval rubbing stones. Thin random flake scrapers were also difficult to distinguish from the thicker random flake knives. In such cases (which were not very numerous), arbitrary limits of dimension were set up for the purposes of description. There are only enough of these specimens to make it plain that these Mogollon people had no very set limitations on the dimensions of stone selected for particular functions.

In this connection it should also be noted that I have used the term "needle" for an implement which has too round and flat a tip to have served the function usually brought to mind by this term. It seems more probable that they served as bodkins. I have also used the term "hammer stone" for implements which I believe were more often used as pecking stones, for roughening the surfaces of

milling stones. Finally, I have used the term "knife" for a type which others term merely "blade." I have continued the use of these terms for ease in comparison with former reports that have used these terms.

3. ARTIFACTS IN THEIR RELATION TO FOOD-GATHERING

There are a number of indications which lead me to believe that the Mogollon people at this period in their development depended for their food subsistence primarily on roots, nuts, and wild seeds, and secondarily on hunting and agriculture. These indications are: (1) The large number of grinding tools found, and the variety of related types. (2) The great frequency of milling implements of types ordinarily associated with an economy of this type, compared with the comparative scarcity of implements of the other types. Although we found all the types that are usually associated with the later periods in the same area, the more undeveloped "primitive" types are the most frequent in this period. Examples of these are the basin-type metates, multi-face pestles, oval and round manos, and pebble mortars. (3) The meager amount of unworked bone found, as contrasted with that found on sites of later periods and other cultures. (4) The fact that all the identifiable worked bone was from the long bones of one animal, the deer. This seems to indicate that the inhabitants of the SU site did not hunt many different kinds of animals. (5) The heterogeneity of unrelated projectile point types seems to indicate that these people were not interested enough in hunting to have developed a stylized type at this period. The crudity of some of the specimens seems to bear out this lack of interest, as other specimens clearly show that they possessed the skill to make fine points.

4. COMPARISONS WITH ARTIFACTS FROM OTHER HORIZONS

A fourth interest in the study of the artifacts from the SU site was their comparison with artifacts of different time periods and cultures. This type of study may outline materials for the study of culture change.

Similarities to artifacts from the Cochise culture (Sayles and Antevs, 1941) are very numerous. So many Cochise types have their counterparts in the SU site that it is certain that the SU stone industry is the descendant and representative of a very long and old tradition (see tables, p. 178). This is clear from the fact that out of thirty-six stone traits occurring in the Cochise culture, thirty-five

COMPARISON OF OCCURRENCE OF COCHISE AND PINE LAWN TRAITS
(After Sayles and Antevs, modified)
Only presence and absence indicated

TRAITS	STAGES			
Ground stone	Sulphur Spring	Chiricahua	San Pedro	Pine Lawn (SU site)
Metates or milling stones				
Slab				
Flat	x	x	x	x
Abraded	0	x	x	x
Concave	x	x	x	x
Basin	0	x	x	x
Mortar				
Pebble	0	x	x	x
Handstones				
Uni-face				
Asymmetrical				
Rubbed	x	x	x	x
Flat	x	x	x	x
Symmetrical				
Flat	x	x	x	x
Bi-face				
Flat	x	x	x	x
Convex	0	x	x	x
Plano-convex	0	x	x	x
Wedge	0	x	0	x
Pit	0	x	x	x
Concave	0	x	0	x
Quadrilateral	?	?	?	x
Maul	0	x	0	x
Multi-face	0	x	0	x
Proto-pestle	0	x	x	x
Cylindrical	0	0	x	x
Chipped stone				
Ax (chopper)				
Plano-convex	x	x	x	x
Bi-face	0	0	x	x
Blade				
Plano-convex	0	x	0	x
Bi-face	0	x	x	x
Disk	0	0	x	?
Flake				
Primary	x	x	x	x
Ground edge	0	x	0	x
Knife	x	x	x	x
Hammer stone	x	0	x	x
Projectile	0	x	x	x
Scraper				
Side	x	x	x	x
Ovoid	x	x	x	x
End	0	x	x	x
Spall	0	x	x	x
Spokeshave	0	x	0	x
Others				
Bone	0	x	0	x
Hearth stones	x	x	x	x
Pits	0	0	x	x
Midden	0	x	x	x
Houses	0	0	x	x

Note: 13 SU traits represented in Sulphur Spring stage.
19 SU traits represented in Chiricahua stage.
3 SU traits represented in San Pedro stage.

were found at the SU site.[1] Of these thirty-five traits, thirteen are also represented in the Sulphur Spring stage, the earliest of the Cochise stages, nineteen have an antiquity extending back to the Chiricahua stage and three go back to the San Pedro stage.

For example, the great majority of SU manos have their counterparts in Cochise hand stones. The slab and basin types of metates closely resemble milling stone types from all stages of the Cochise culture. The SU multi-face pestles are like the Cochise multi-face hand stones in every respect. The cylindrical pestles are very much like those from the San Pedro stage. The plano-convex and bi-face choppers are practically identical with the plano-convex and bi-face hand axes of the Cochise culture. The same is true of plano-convex scrapers, scrapers with sinuous, serrated edges, random flake scrapers, flake knives and the majority of other flake implements, with the exception of some types of projectile points.

These projectile points, as well as some other traits of the Pine Lawn phase, may be more readily compared to artifacts from the Georgetown and San Francisco phases of the Mogollon culture. This is particularly true of a characteristic type of projectile point—that with diagonal notches and a slightly convex expanding base wider than the shoulder. These are much like typical specimens from Mogollon 1:15 and at least one specimen of the same type from Starkweather. The tubular stone pipe with separate bone stem, notched awls, and the trough-type metate can also be compared more readily with types of implements from these later Mogollon phases.

In reference to this trough-type metate, it should be noted that its rounded contours, slightly constricted sides at the open end, and lack of shelf at the closed end give it a closer resemblance to its prototype, the basin metate with one end open, than to Anasazi metates.

Some traits found at the SU site are so widespread in the Southwest that it is difficult to compare them readily with artifacts from any particular locality or period. Such artifacts are the natural and saucer-shaped olivella beads, disk beads, hammer stones of the pebble and core types, the full-grooved maul, and random flakes used as knives and scrapers. These artifacts have been found in relative frequency on most pit house sites in the Southwest.

A comparison of the SU artifacts with those from early Basket Maker (Anasazi) sites, permits the following statements to be made:

[1] All tools were compared with actual Cochise specimens, when possible, or with published photographs and drawings (Sayles and Antevs, 1941). Type names were disregarded in order to avoid any possible confusion due to different terminologies.

(1) The lateral notched projectile points (Fig. 72, *a*) have a certain resemblance to Basket Maker atlatl dart points in size and shape; (2) other artifacts which are like Anasazi implements are the rectangular, symmetrical manos with parallel grinding surfaces; (3) a third kind of artifact which is Anasazi-like is the conical clay pipe; (4) the short, massive bone awls are similar to Anasazi awls.

The only Hohokam-like trait occurring at the SU site is the abrading slab, or paint grinding stone.

In summary, then, it may be said that the majority of stone and bone implements are of relatively "primitive" types, with most of the natural surfaces of the material unmodified except by use. Examples in which all surfaces of the artifact were fashioned occur comparatively infrequently. Finally, these stone implements appear to be representative of a stable stone-industry tradition extending as far back as the beginning of the Cochise culture. Certain stone implements such as troughed metates and diagonal-notched projectile points developed in the Pine Lawn phase; and these, together with many of the types inherited from the Cochise culture, were retained in the latter Mogollon phases.

Thus, the stone industry of the Pine Lawn phase had its roots in the remote Cochise and a few branches in the later Mogollon culture.

MANOS

(Fig. 58)

Manos with single grinding surfaces:

(a) Oblong in outline, surfaces parallel, grinding surface convex..... 9
From Test Trench 27, Pit Houses H, I, J, L, N, Surface House 2
Length: maximum, 19.9 cm.; minimum, 17 cm.; average, 19 cm.
Width: maximum, 13 cm.; minimum, 9.1 cm.; average, 10 cm.
Thickness: maximum, 6 cm.; minimum, 2.3 cm.; average, 3.5 cm.

(b) Oblong in outline, surfaces parallel, grinding surface slightly convex.. 1
From Pit House H
Length, 19.5 cm.; width, 9.5 cm.; thickness, 4 cm.

(c) Oblong in outline, surfaces parallel, grinding surface flat..... 22
From Pit Houses J, M, N, O, P, Surface Houses 2 and 3, Pit Houses H, I, stripping, Test Trench 27
Length: maximum, 22.7 cm.; minimum, 15 cm.; average, 17 cm.
Width: maximum, 12.7 cm.; minimum, 9.4 cm.; average, 11 cm.
Thickness: maximum, 6.4 cm.; minimum, 3.1 cm.; average, 4 cm.

(d) Oblong in outline, wedge shape in cross section, grinding surface flat.. 5
From Pit Houses H, J, L, Surface House 3
Length: maximum, 19.5 cm.; minimum, 15.7 cm.; average, 17 cm.
Width: maximum, 11.1 cm.; minimum, 8.2 cm.; average, 9.7 cm.
Thickness: maximum, 4.9 cm.; minimum, 4.1 cm.; average, 4.6 cm.

(e) Oval in outline, surfaces parallel, grinding surface convex..... 3
From Pit Houses J, N, P
Lengths, 17, 14.2, 13.6 cm.; widths, 11.8, 10.1, 10.4 cm.; thicknesses, 4.8, 6.5, 3.1 cm.

(f) Oval in outline, wedge-shape in cross section, grinding surface convex.. 1
From Pit House N
Length, 14.6 cm.; width, 11.8 cm.; thickness, 4.8 cm.

(g) Oval in outline, surfaces parallel, grinding surface slightly convex.... 2
From Pit Houses J, L
Lengths, 14.3, 13.2 cm.; widths, 10.2, 10.7 cm.; thicknesses, 2.4, 4.9 cm.

(h) Oval in outline, surfaces parallel, grinding surface flat..... 10
From Pit Houses H, I, M, N, Surface Houses 2 and 3
Length: maximum, 18.6 cm.; minimum, 12.5 cm.; average, 14.8 cm.
Width: maximum, 11.9 cm.; minimum, 9.7 cm.; average, 10.7 cm.
Thickness: maximum, 5.6 cm.; minimum, 2.6 cm.; average, 4.7 cm.

(i) Round in outline, surfaces parallel, grinding surface convex..... 1
From Surface House 3
Diameter, 12.4 cm.; thickness, 4 cm.

(j) Disk-shape, surfaces parallel, grinding surface flat..... 2
From Pit House M
Diameters, 8.4, 14.3 cm.; thicknesses, 3.1, 4 cm.

MANOS—*continued*

(Fig. 58)

(k) Rectangular in outline, surfaces parallel, grinding surface slightly convex..... 1
From Pit House I
Length, 13 cm.; width, 10 cm.; thickness, 4.5 cm.

(l) Rectangular in outline with rounded ends, surfaces parallel, grinding surface flat..... 7
From Pit Houses H, I, J, N
Length: maximum, 22.3 cm.; minimum, 10 cm.; average, 16.2 cm.
Width: maximum, 14 cm.; minimum, 9.2 cm.; average, 11.7 cm.
Thickness: maximum, 6.3 cm.; minimum, 2.9 cm.; average, 4 cm.

(m) Rectangular in outline, wedge-shape in cross section, grinding surface flat..... 5
From Test Trench 27, Pit Houses H, J, N, P
Length: maximum, 15.5 cm.; minimum, 14.8 cm.; average, 15 cm.
Width: maximum, 11.3 cm.; minimum, 8.9 cm.; average, 9.9 cm.
Thickness: maximum, 6.2 cm.; minimum, 3 cm.; average, 4.3 cm.

(n) Squarish in outline, surfaces parallel, grinding surface convex..... 3
From Pit Houses L, M, P
Length: maximum, 17.8 cm.; minimum, 11.2 cm.
Width: maximum, 14.5 cm.; minimum, 9.4 cm.
Thickness: maximum, 6.3 cm.; minimum, 4.8 cm.

(o) Bean-shape in outline, parallel surfaces, grinding surface convex..... 1
From Pit House H, stripping
Length, 18.4 cm.; width, 11.1 cm.; thickness, 2.9 cm.

Manos with two grinding surfaces:

(a) Round in outline, surfaces parallel, flat, pecked..... 6
From Pit House I, Surface House 2, Pit 4
Length: maximum, 13.5 cm.; minimum, 11.4 cm.; average, 12.6 cm.
Width: maximum, 11.3 cm.; minimum, 9.3 cm.; average, 10 cm.
Thickness: maximum, 5 cm.; minimum, 3.3 cm.; average, 4.3 cm.

(b) Oval in outline; surfaces, parallel and flat..... 4
From Pit Houses I, M, N, Surface House 2
Length: maximum, 14.5 cm.; minimum, 11.7 cm.; average, 13.7 cm.
Width: maximum, 10.8 cm.; minimum, 8.8 cm.; average, 9.4 cm.
Thickness: maximum, 3.8 cm.; minimum, 2.4 cm.; average, 3.1 cm.

(c) Rectangular in outline, surfaces parallel, flat..... 1
From Pit House I
Length, 11.5 cm.; width, 8.4 cm.

Materials: diorite, trachyte, granite, scoriaceous rhyolite

Pit for finger grip in upper surface of several specimens; two specimens with slightly concave upper surfaces.

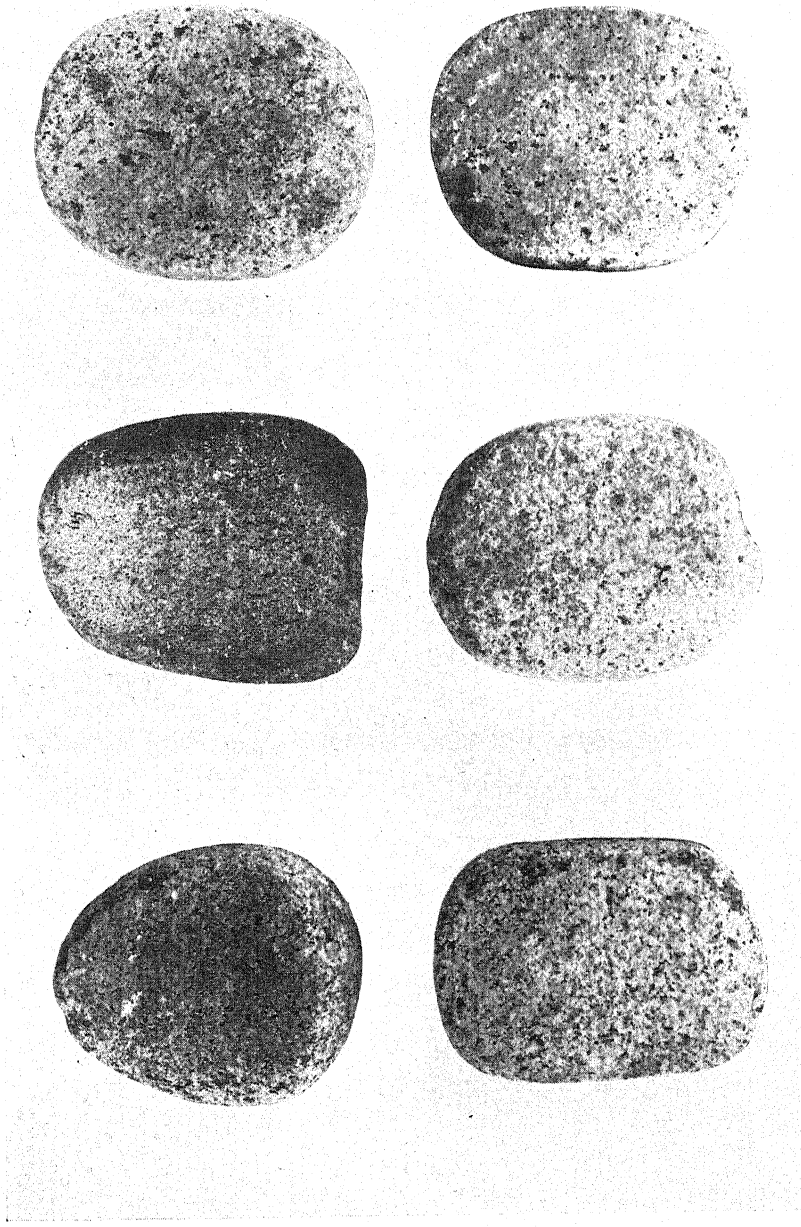


FIG. 58. Manos with two grinding surfaces. Scale 2:7.

RUBBING STONES

(Fig. 59)

Rubbing stones with single rubbing surface:

(a) Oval in outline, surfaces parallel, rubbing surface flat, upper surface convex..... 9
From Pit Houses L, M, N, Surface Houses 2 and 3
Length: maximum, 13 cm.; minimum, 8 cm.; average, 9.8 cm.
Width: maximum, 10 cm.; minimum, 6.2 cm.; average, 7.9 cm.
Thickness: maximum, 5.6 cm.; minimum, 2.6 cm.; average, 4.3 cm.

(b) Oval in outline, wedge-shape in cross section, rubbing surface smooth.. 2
From Pit Houses J, M
Lengths, 8.8, 9.3 cm.; widths, 6.1, 6.9 cm.; thicknesses, 3.8, 2.4 cm.

(c) Roundish in outline, parallel surfaces, rubbing surface flat, upper surface convex..... 17
From Pit Houses H, I, J, L, N, P, Surface Houses 2 and 3, Test Trench 27, Pit 5
Length: maximum, 12 cm.; minimum, 7.1 cm.; average, 10 cm.
Width: maximum, 11.7 cm.; minimum, 6.4 cm.; average, 8.8 cm.
Thickness: maximum, 7.2 cm.; minimum, 2.9 cm.; average, 4.3 cm.

(d) Oblong in outline, parallel surfaces, rubbing surface flat, upper surface convex..... 7
From Pit Houses L, P; stripping around Pit House H, Surface House 3
Length: maximum, 15.5 cm.; minimum, 8.7 cm.; average, 12.1 cm.
Width: maximum, 10.7 cm.; minimum, 8 cm.; average, 9.2 cm.
Thickness: maximum, 8 cm.; minimum, 4.6 cm.; average, 5.9 cm.

(e) Bean shape, triangular, and lozenge shapes, in outline, rubbing surface flat, upper surface convex or rough..... 7
From Pit House H, Surface House 2, Test Trench 27; stripping around Pit Houses I, N, Surface House 3
Length: maximum, 12.2 cm.; minimum, 7.8 cm.; average, 9.9 cm.
Width: maximum, 9 cm.; minimum, 6.4 cm.; average, 7.1 cm.
Thickness: maximum, 4.5 cm.; minimum, 2.9 cm.; average, 3.6 cm.

Rubbing stones with two rubbing surfaces:

(a) Oval in outline, surfaces parallel, flat..... 8
From Pit Houses H, I, M, N, P, Surface House 2; stripping around Surface House 3
Length: maximum, 12.4 cm.; minimum, 8.8 cm.; average, 10.6 cm.
Width: maximum, 10 cm.; minimum, 7.9 cm.; average, 8.7 cm.
Thickness: maximum, 6 cm.; minimum, 3.2 cm.; average, 4 cm.

(b) Irregular shape in outline, surfaces parallel, rough..... 2
From Pit House N
Lengths, 10, 13 cm.; widths, 9, 10.5 cm.; thicknesses, 3, 5.4 cm.

(c) Irregular shape in outline, wedge-shape in cross section, rubbing surfaces smooth..... 1
From Pit House L
Length, 9.6 cm.; width, 9.2 cm.; thickness, 6 cm.

Materials: sandstone, limestone, scoriaceous rhyolite

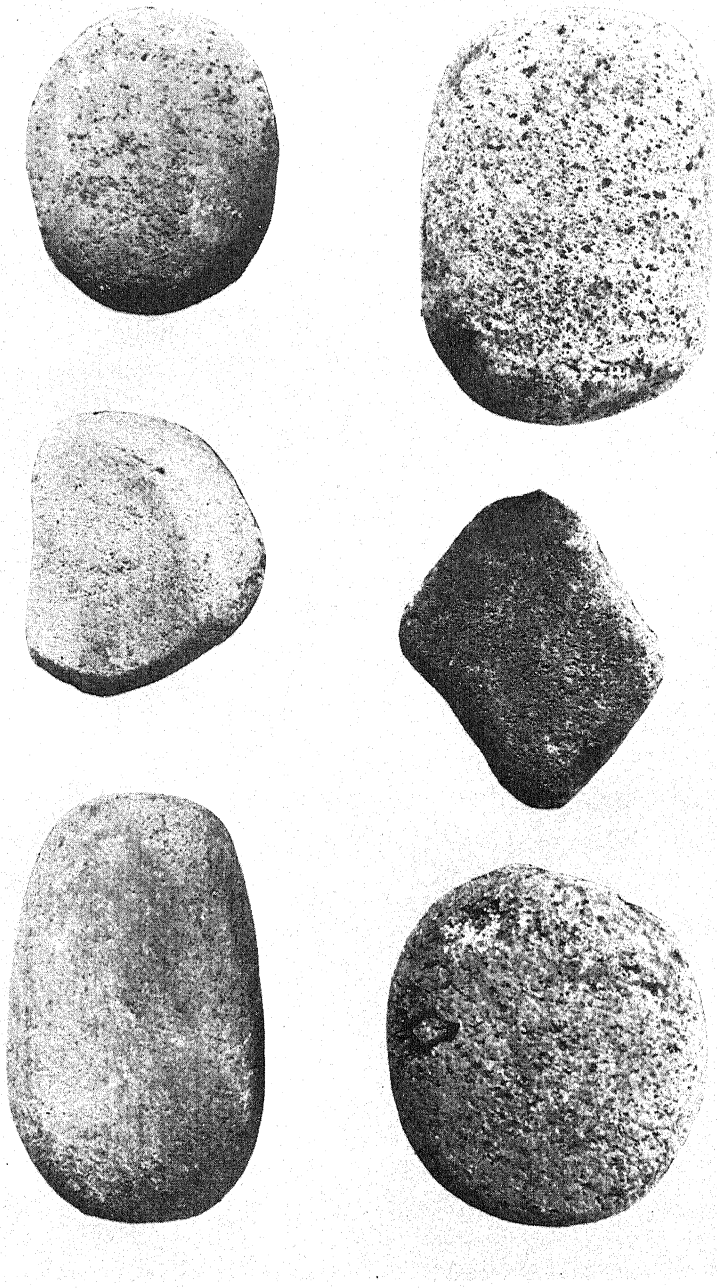


FIG. 59. Rubbing stones (miscellaneous types). Scale 5:9.

METATES

(Figs. 60–64)

(a) Slab type, large slab, generally oblong or oval in outline with flat or slightly concave upper surface; bottom and sides of boulder unworked, concavity sometimes pecked 14

From Pit Houses I, L, N, O, P

Length: maximum, 62 cm.; minimum, 47.2 cm.; average, 52.5 cm.

Width: maximum, 52.8 cm.; minimum, 21.1 cm.; average, 34.5 cm.

Thickness: maximum, 21.3 cm.; minimum, 3.3 cm.; average, 10 cm.

(b) Basin type, unshaped blocks of stone with oval grinding surface somewhat basin-shaped, and extending to one edge of stone 9

From Pit Houses I, N, P, Surface Houses 2 and 3

Length: maximum, 64.5 cm.; minimum, 41.3 cm.; average, 52.5 cm.

Width: maximum, 50.3 cm.; minimum, 22.2 cm.; average, 38.7 cm.

Thickness: maximum, 19.5 cm.; minimum, 7 cm.; average, 12.8 cm.

(c) Trough type, unshaped blocks of stone with trough-shaped grinding surface, open at one end only; trough slopes up steeply at closed end 7

From Pit Houses H, I, J, N, O

Length: maximum, 59.8 cm.; minimum, 52.1 cm.; average, 54.6 cm.

Width: maximum, 45 cm.; minimum, 22.8 cm.; average, 34.1 cm.

Thickness: maximum, 15.3 cm.; minimum, 11.9 cm.; average, 13.8 cm.

(d) Basin type with secondary depression, unshaped blocks of stone with grinding surface worn to slight depression, small round cup-shaped hole in center of basin, bottom and sides of boulder unaltered 4

From Pit Houses H, J, L

Lengths, 38.1, 51.7, 52.5, 37.8 cm.; widths, 18.5, 40.7, 47, 37.4 cm.; thicknesses, 10.4, 12.8, 16.5, 18.4 cm.; diameter of depressions, 9.7, 11.7, 12.3 cm.; depths of depressions, 3–7.5 cm.

FIG. 60. Slab metate. Scale 1:4.

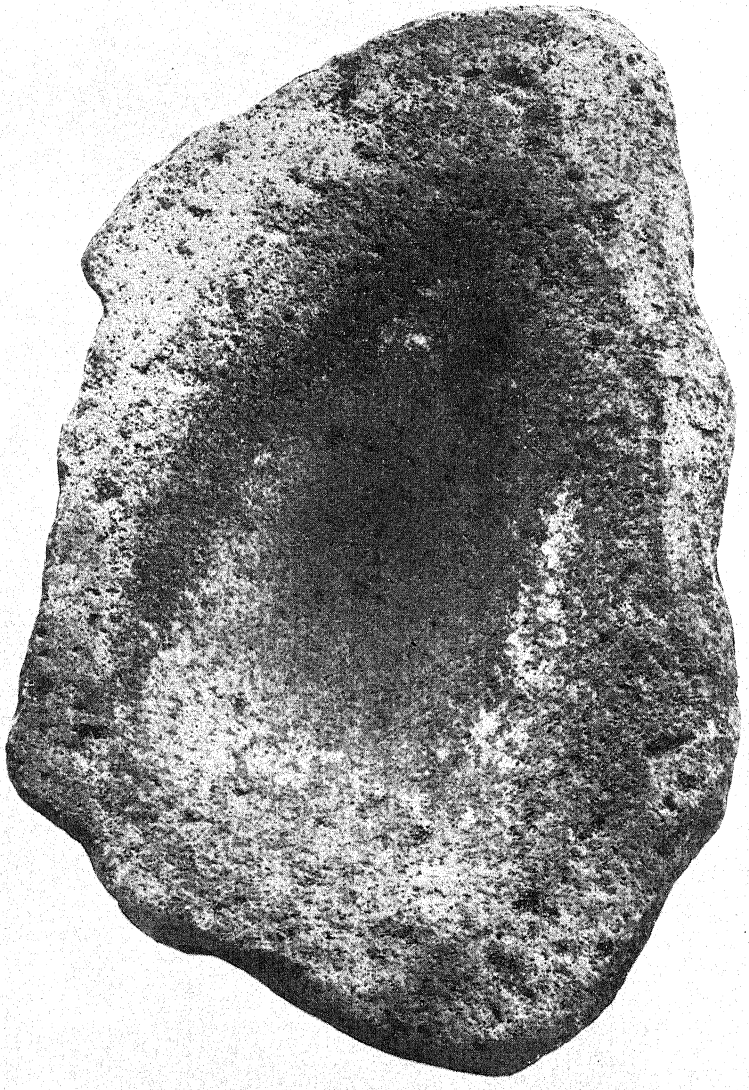


FIG. 61. Basin metate. Scale 3:13.

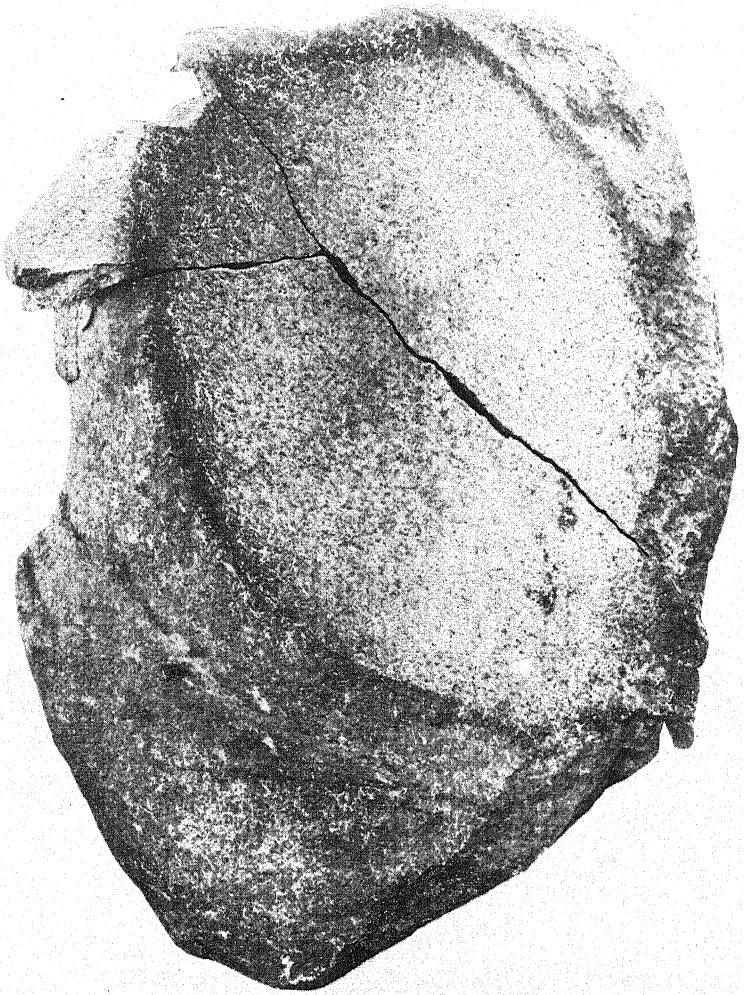


FIG. 62. Basin metate. Scale 1:4.

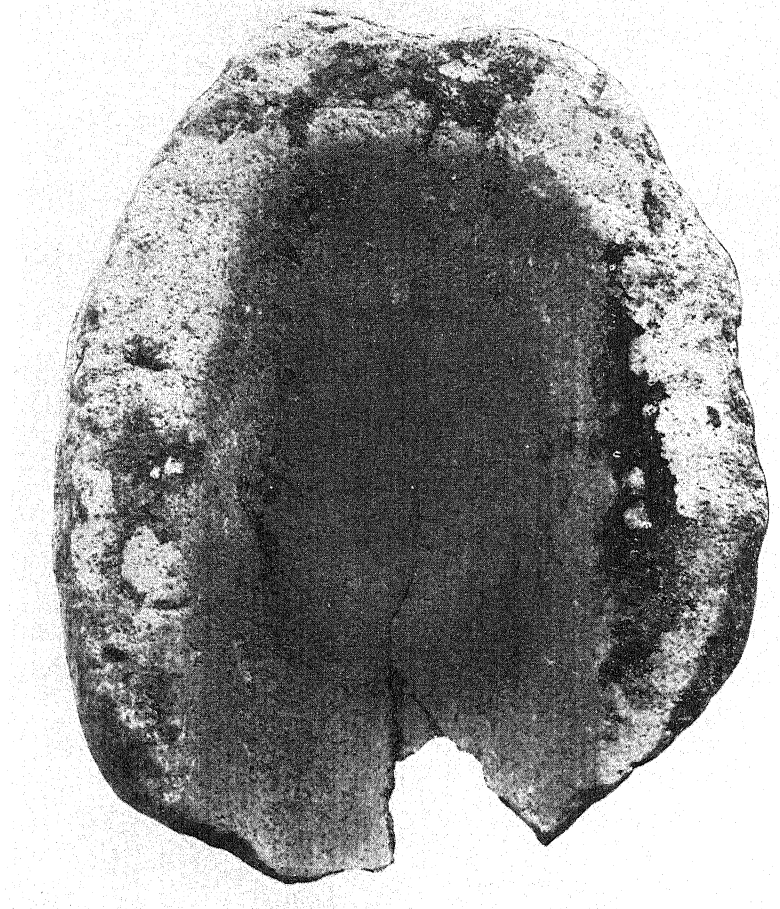


FIG. 63. Trough metate. Scale 4:19.

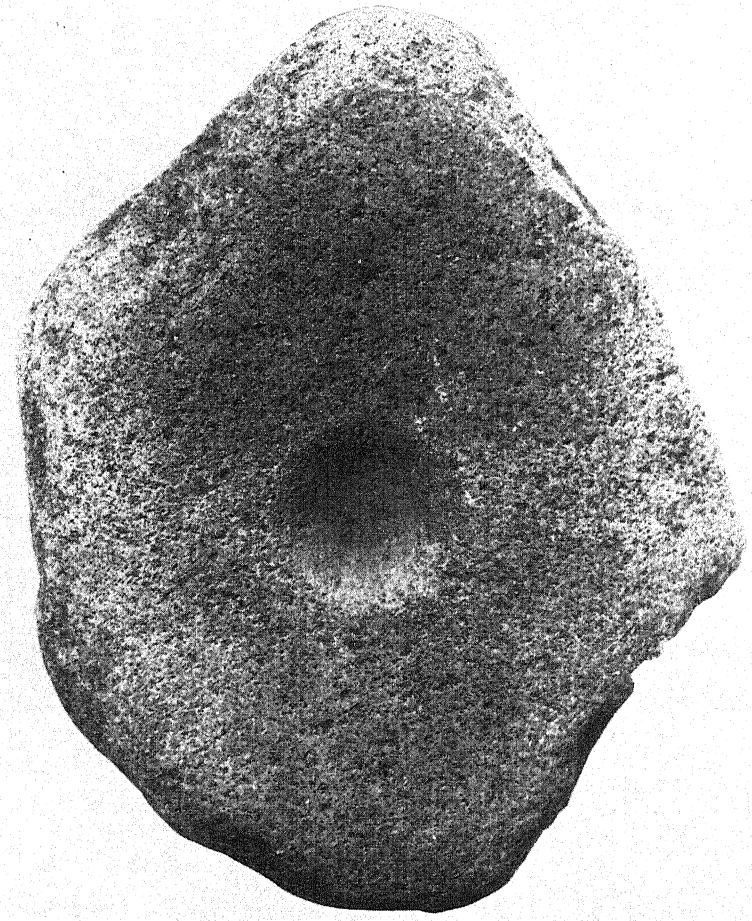


FIG. 64. Basin metate with secondary depression. Scale 4:17.

SMALL METATE-LIKE GRINDING STONES

(Fig. 65)

With single grinding surface:

(a) Large slabs of stone, roughly rectangular or irregular shape in outline, with smooth grinding surface, occasionally slightly concave; sides and bottom usually unworked, occasionally bottom beveled so that grinding surface is sloping..... 19

From Pit Houses J, M, N, O, P, Surface House 2, Test Trench 23; stripping around Pit Houses I, P and Surface House 3

Length: maximum, 38.3 cm.; minimum, 20.3 cm.; average, 29 cm.

Width: maximum, 29 cm.; minimum, 11.9 cm.; average, 20.5 cm.

Thickness: maximum, 13.5 cm.; minimum, 3.5 cm.; average, 7.8 cm.

With two grinding surfaces:

(a) Roughly rectangular in outline, surfaces worked by pecking, smoothed by grinding..... 4

From Pit Houses N, O, P

Lengths, 19.8, 27, 14.6, 21.3 cm.; widths, 14.2, 15.5, 10.3, 17.2 cm.; thicknesses, 10.4, 8.3, 6, 9.6 cm.

ABRADING SLABS or PAINT GRINDING STONES

(Not illustrated)

(a) Small slabs of stone roughly rectangular in outline, with single flat, or slightly concave, grinding surface, worked by pecking, smoothed by grinding, occasionally showing traces of paint..... 9

Length: maximum, 28.1 cm.; minimum, 16.3 cm.; average, 20 cm.

Width: maximum, 18.9 cm.; minimum, 10.7 cm.; average, 14.3 cm.

Thickness: maximum, 6.5 cm.; minimum, 3 cm.; average, 4.5 cm.

From Pit Houses I, J, L, M, Surface Houses 2 and 3; stripping around Surface House 3

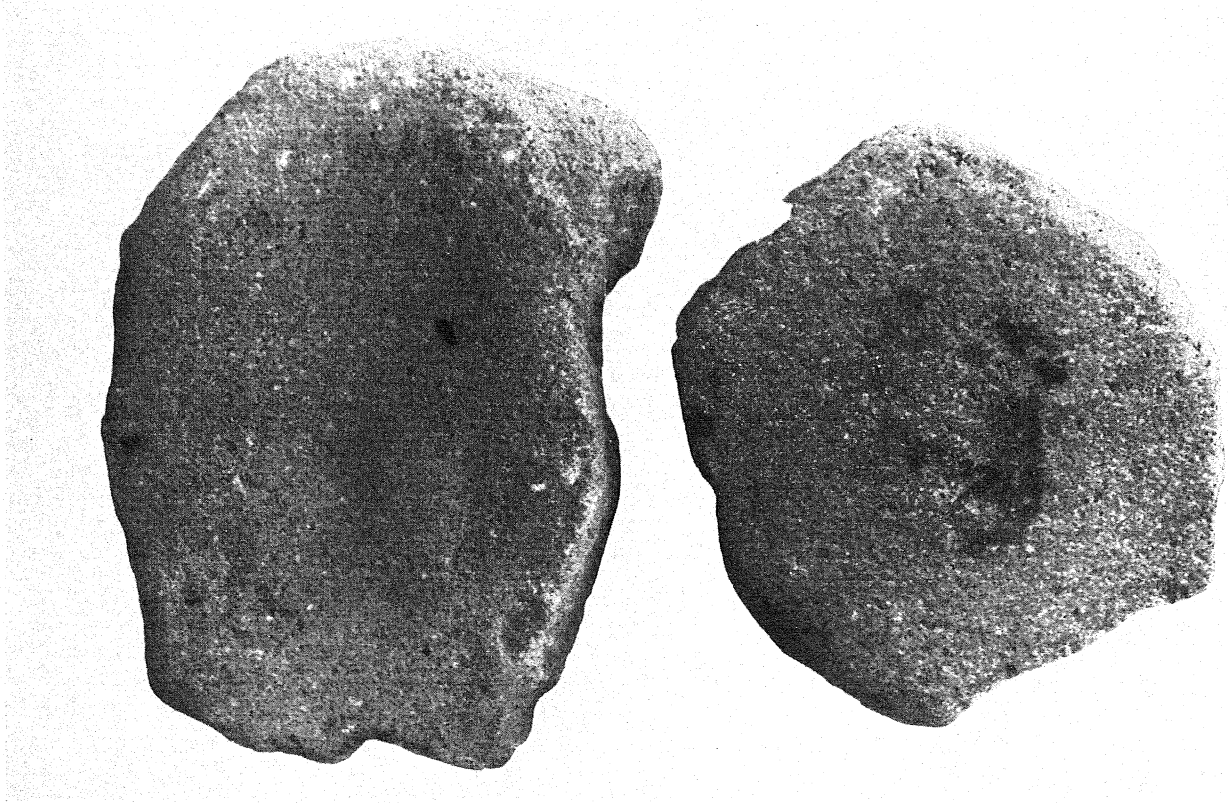


FIG. 65. Small metate-like grinding stones. Scale 5:17.

MORTARS

(Fig. 66)

(a) Boulder type (see metate of basin type with secondary depression, Fig. 64). 4

(b) Pebble type, large roundish pebbles, exterior unworked, with deep, cup-shaped depression pecked in center of one face..... 27

From Pit Houses H, J, M, N, O, P, Surface House 3, Test Trench 27; stripping around Pit House N

Length: maximum, 30 cm.; minimum, 17 cm.; average, 22.5 cm.

Width: maximum, 24.9 cm.; minimum, 13.7 cm.; average, 17 cm.

Thickness: maximum, 20.6 cm.; minimum, 7.5 cm.; average, 12.8 cm.

Diameter of depressions: maximum, 23 cm.; minimum, 8 cm.; average, 12.9 cm.

Depth of depressions: maximum, 15 cm.; minimum, 3.5 cm.; average, 8 cm.

Materials: limestone, tuff

(c) Large rough roundish boulder, exterior unworked, with deep cup-shaped cavity pecked in center of one face..... 1

From Pit House P

Length, 43.6 cm.; width, 41.4 cm.; thickness, 23.3 cm.

Width of depression, 23 cm.; depth of depression, 14.9 cm.

Material: tuff

STONE BOWLS or DISHES

(Fig. 66)

Roundish pebbles with depression in one face; depth of depression variable; occasionally worked all over..... 8

From Pit Houses L, N, P, Surface House 2

Length: maximum, 15.5 cm.; minimum, 5.7 cm.; average, 9.8 cm.

Width: maximum, 11.5 cm.; minimum, 5 cm.; average, 8.9 cm.

Thickness: maximum, 10 cm.; minimum, 3.7 cm.; average, 5.6 cm.

PITTED PEBBLES

(Not illustrated)

Pebbles having small, round depression worked in center of one surface, other surfaces unaltered..... 10

From Pit Houses H, L, M, P, Surface House 2, stripping around Surface House 3

Length: maximum, 22 cm.; minimum, 6.5 cm.; average, 12.9 cm.

Width: maximum, 18.2 cm.; minimum, 6.2 cm.; average, 10.7 cm.

Thickness: maximum, 11.7 cm.; minimum, 4.5 cm.; average, 7 cm.

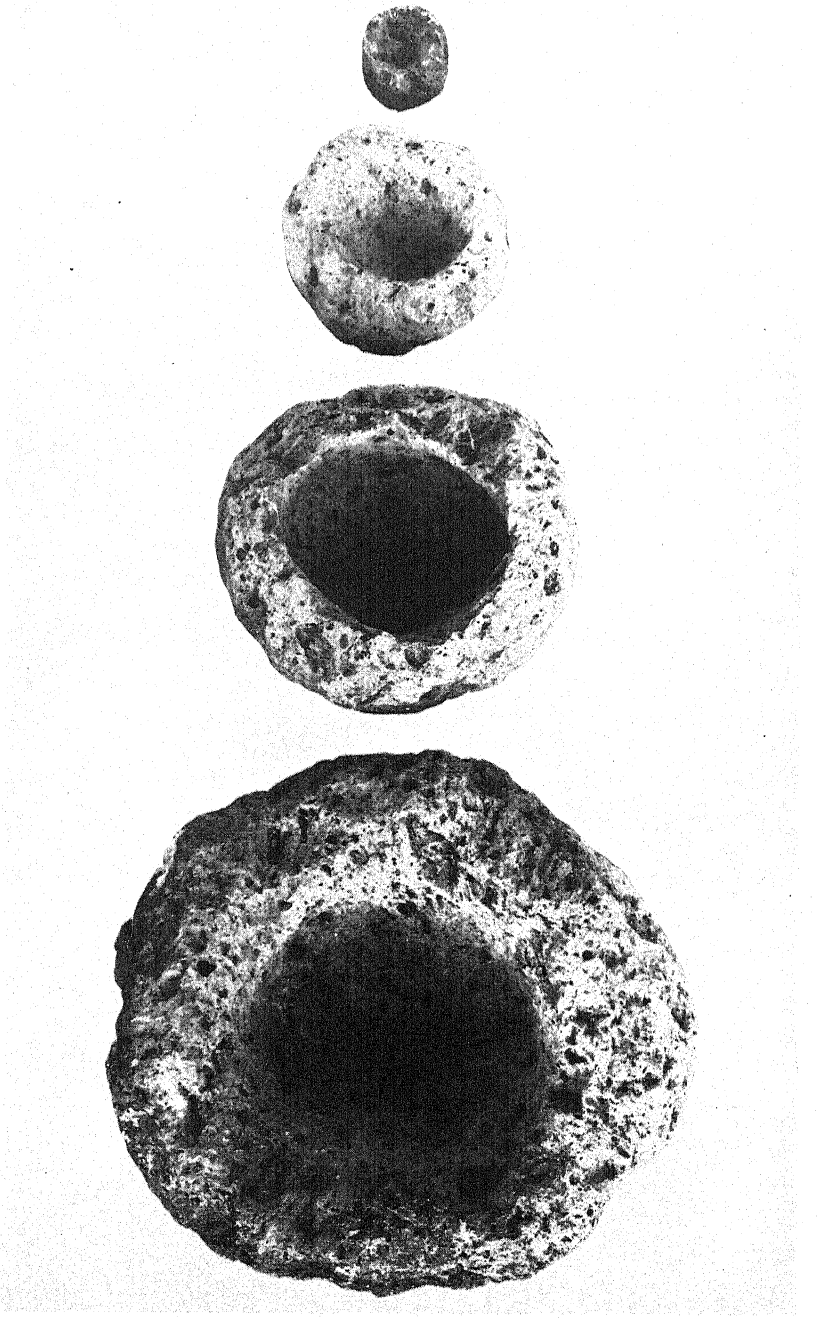


FIG. 66. Mortars and stone dish. Scale 2:11.

PESTLES

(Fig. 67)

(a) Angular type, long angular stone unaltered except for one end which is round, pecked, and battered 21

From Pit Houses H, I, J, L, N, O, P, Surface Houses 2 and 3, and stripping around H, N

Length: maximum, 29.4 cm.; minimum, 14.7 cm.; average, 17.5 cm.

Width: maximum, 10.6 cm.; minimum, 6 cm.; average, 7.9 cm.

Thickness: maximum, 8.6 cm.; minimum, 4 cm.; average, 5.8 cm.

(b) Multi-faced type, roundish pebbles with some pecked and battered flat surfaces 24

From Pit Houses H, J, L, N, O, P, Surface House 3 and stripping around Pit House N and Surface House 3

Length: maximum, 15.3 cm.; minimum, 6.2 cm.; average, 11.5 cm.

Width: maximum, 12.8 cm.; minimum, 5.8 cm.; average, 9.1 cm.

Thickness: maximum, 11.7 cm.; minimum, 5.2 cm.; average, 7.5 cm.

(c) Cylindrical type, long roundish generally cylindrical stones, with pecked surfaces and ends 2

From Surface House 2, Test Trench 27

Lengths, 18.4, 15.5 cm.; diameters, 7.7, 4.6 cm.

(d) Crushing and pounding implement. Irregular stone with forked end, surfaces roundish, pecked; one round end shows battering marks 1

From Pit House M

Length, 9.3 cm.; width, 6.3 cm.; thickness, 4.8 cm.

Materials: trachyte, andesite, basalt

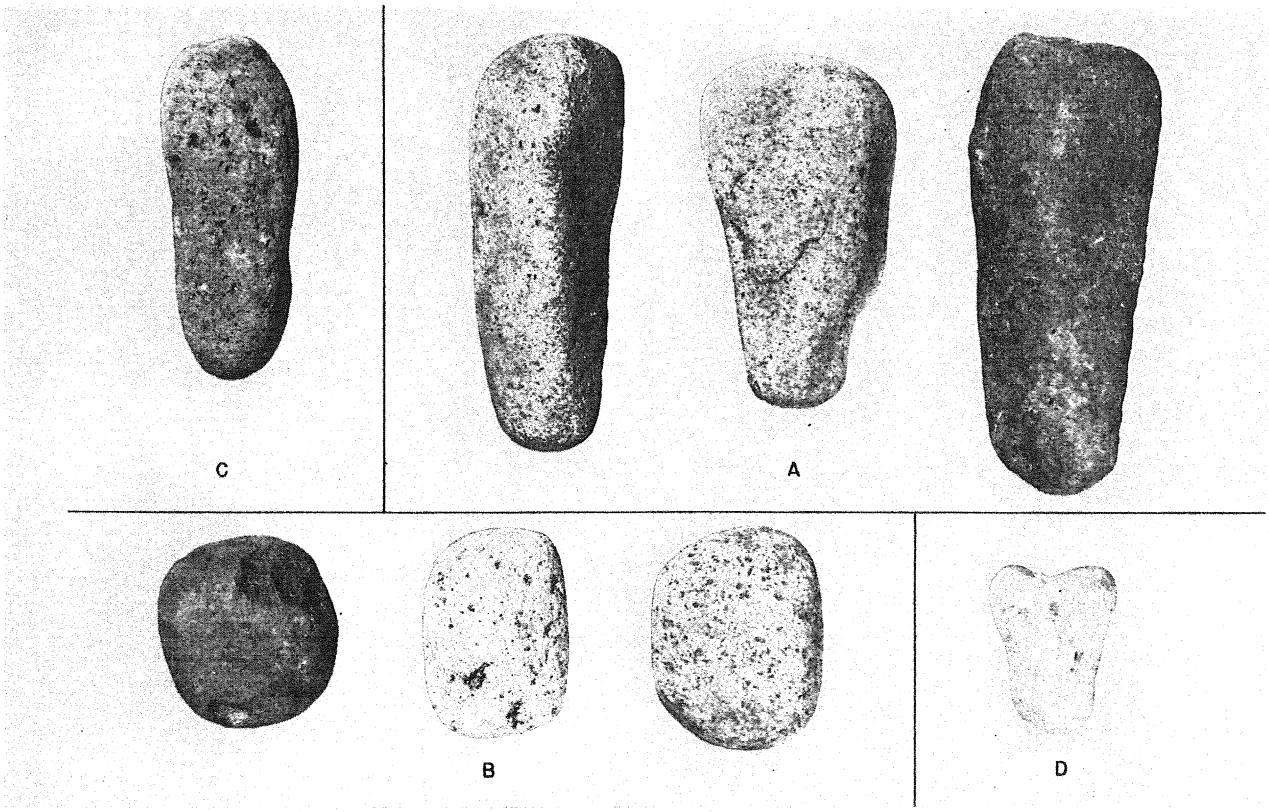


FIG. 67. Pestles (types a–d). Scale 1:4.

POLISHING STONES

(Fig. 68)

Oval or roundish in outline with one or more smooth, flat polishing surfaces. . 92

From Pit Houses H, I, J, L, M, N, O, P, Surface Houses 2 and 3, Pit 5, Test Trench 27, stripping around Pit House N and Surface House 3

Length: maximum, 10 cm.; minimum, 3.4 cm.; average, 6 cm.

Width: maximum, 9 cm.; minimum, 2.1 cm.; average, 4.5 cm.

Thickness: maximum, 4.4 cm.; minimum, 1.2 cm.; average, 2 cm.

Materials: limestone, porphyritic diorite

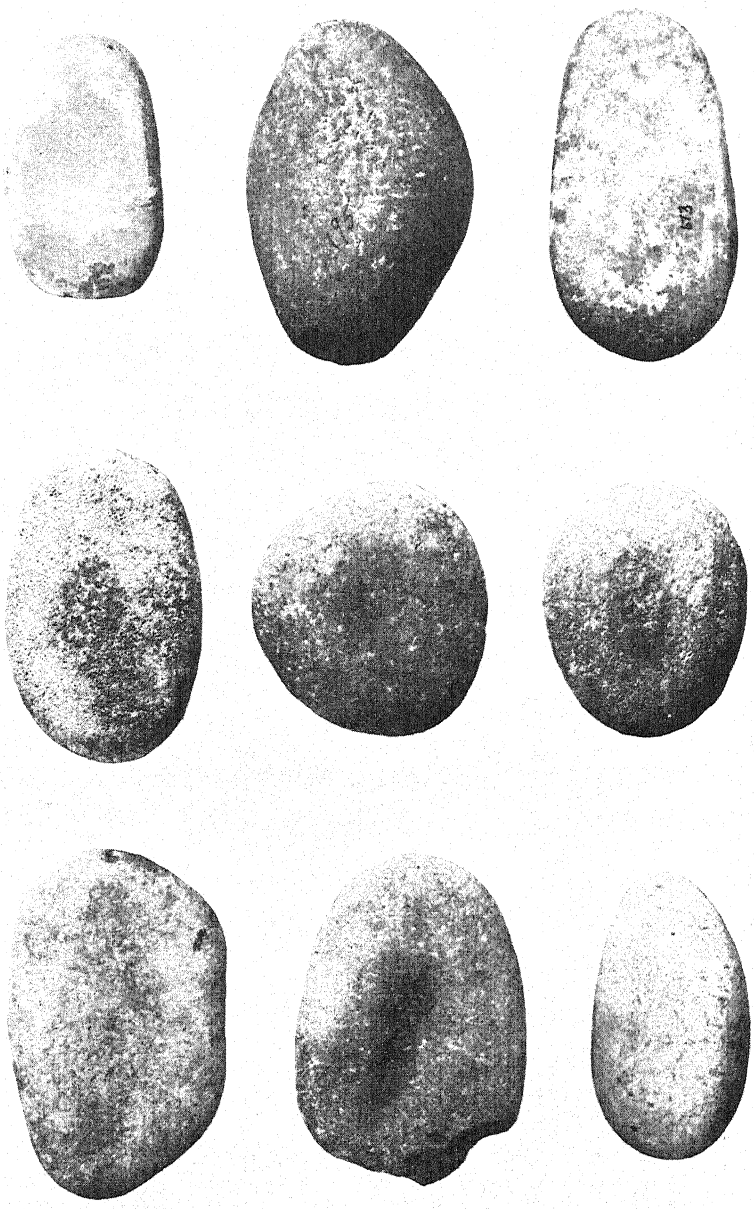


FIG. 68. Polishing stones. Scale 1:2.

HAMMER STONES

(Fig. 69)

Battered and pitted pebbles, mostly roundish and angular shapes..... 45

From Pit Houses I, J, L, M, N, O, P, Surface Houses 2 and 3, Pit 5, Test Trench 27, stripping around Pit House N, Surface House 3

Length: maximum, 13 cm.; minimum, 4.6 cm.

Materials: flint, quartzite, quartz, andesite, chalcedony

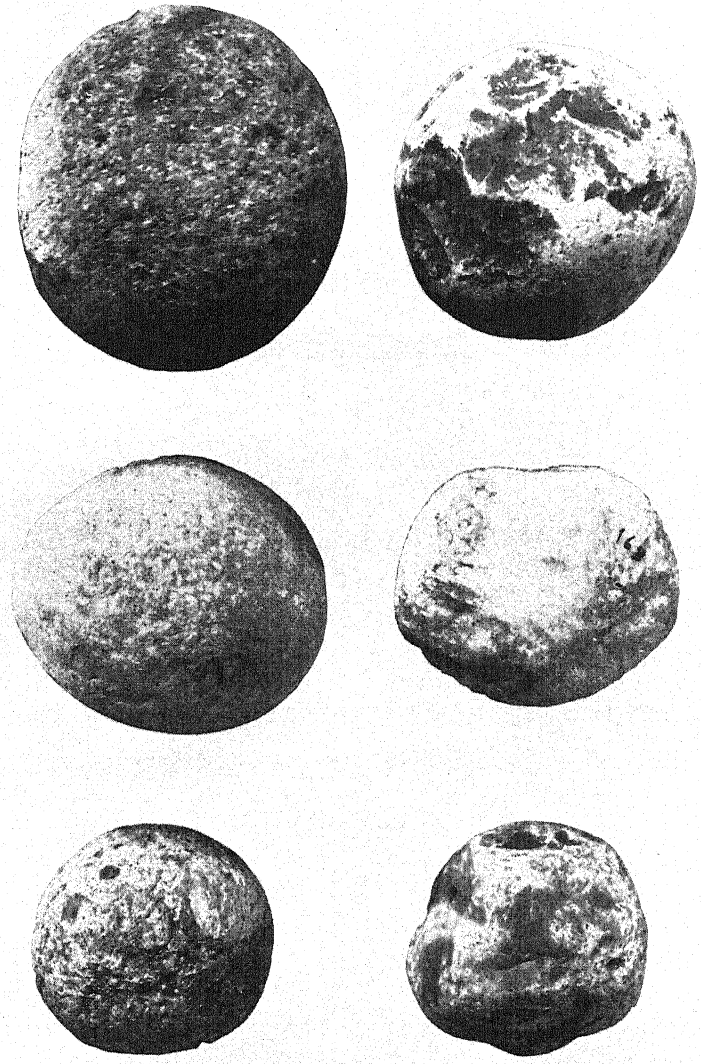


FIG. 69. Hammer stones. Scale 5:9

MAULS

(Fig. 70)

Roundish pebbles, oval in outline, with full groove around middle, one or more ends battered..... 23

From Pit Houses I, J, L, M, N, P, Surface Houses 2 and 3, Test Trench 27, stripping around Surface House 3

Length: maximum, 22.3 cm.; minimum, 9.4 cm.; average, 13.3 cm.

Width: maximum, 12.4 cm.; minimum, 5.8 cm.; average, 8.6 cm.

Thickness: maximum, 8.1 cm.; minimum, 4.9 cm.; average, 6.2 cm.

Materials: limestone, syenite

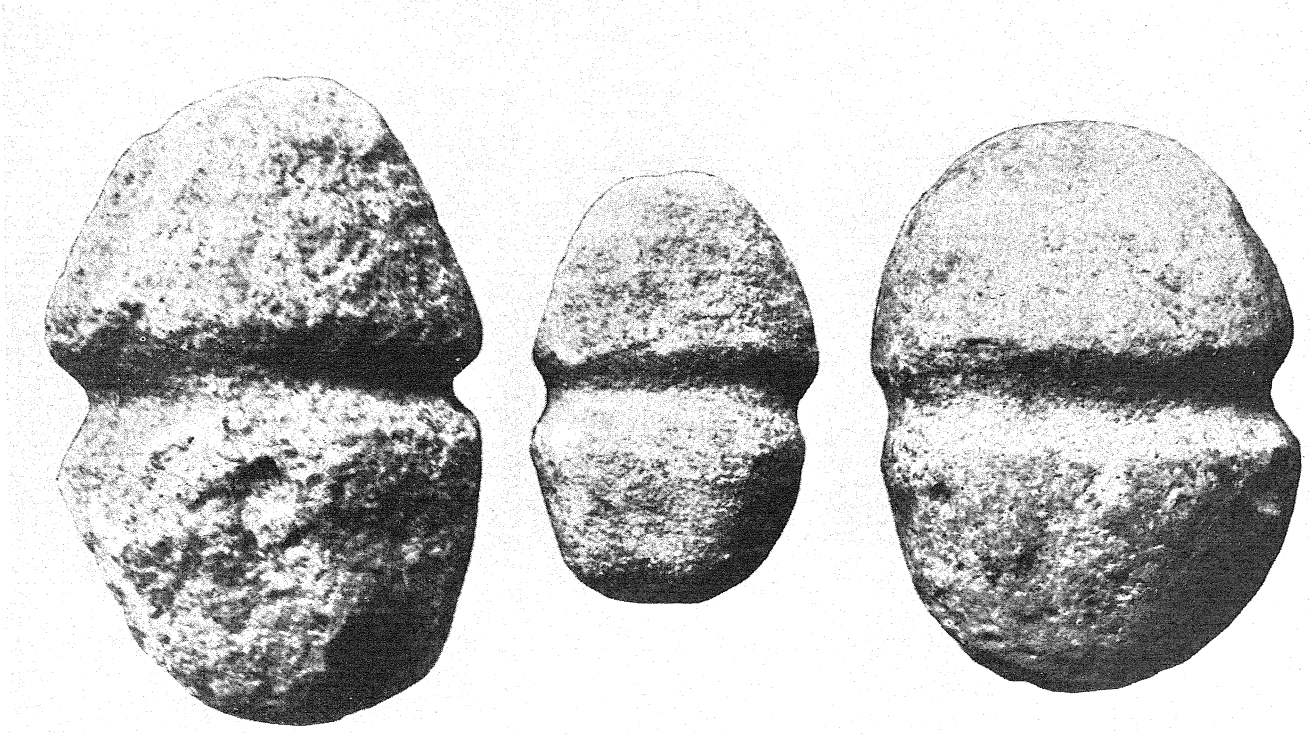


FIG. 70. Mauls. Scale 5:8.

PIPES

(Fig. 71)

Cylindrical, or tubular type, tapering slightly from larger bowl end to smaller stem end; greatest diameter about seven-eighths distance from stem end; central perforation through pipe is narrower at stem end; two specimens with bores unfinished..... 8

From Pit Houses I, N, Surface House 2, stripping around Pit Houses H and N

Lengths: maximum, 9.3 cm.; minimum, 3.7 cm.; average, 5.9 cm.

Diameters: maximum, 5.6 cm.; minimum, 2.8 cm.; average, 3.6 cm.

Diameter of bore: maximum, 2.6 cm.; minimum, 1.6 cm.; average, 2 cm.

Materials: scoria, rhyolite

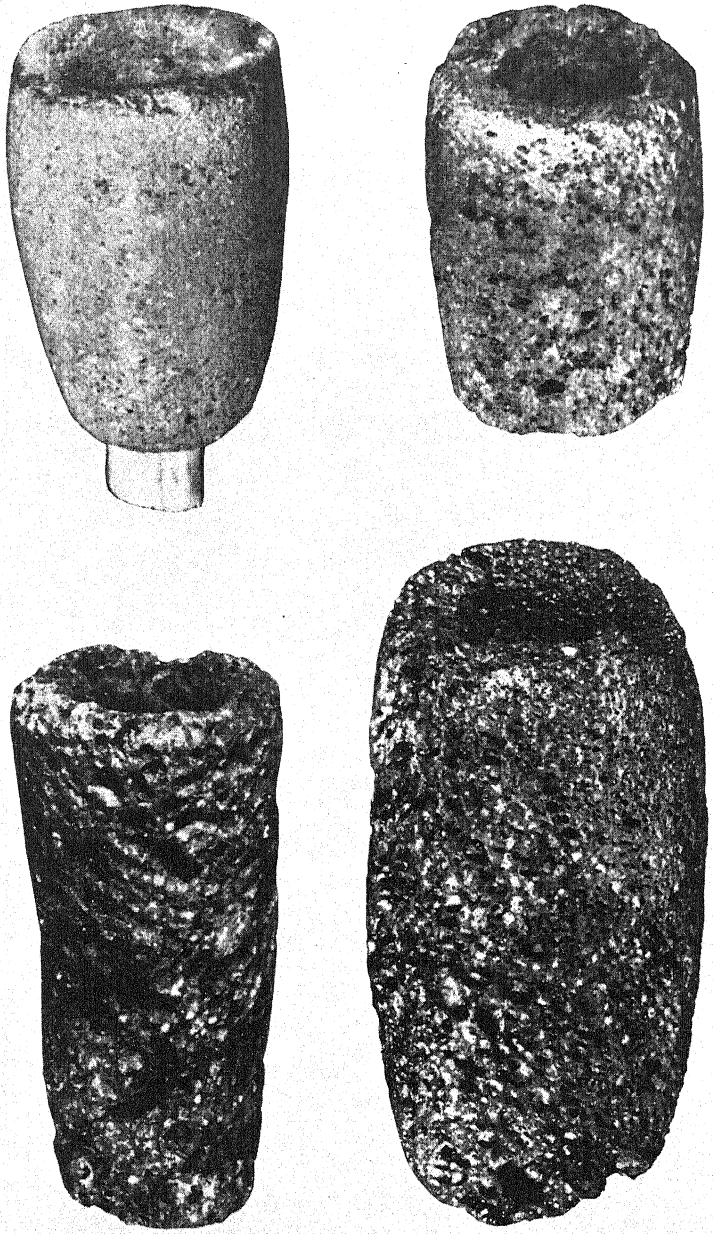


FIG. 71. Tubular pipes. Scale: specimen on lower right, 9:10; remainder, 7:6.

PROJECTILE POINTS

(Figs. 72–74)

(a) Lateral notched, expanding stem narrower than shoulder, straight base, straight edges; two specimens with serrate edges 4

From Pit House I, stripping around Test Trench 27, Pit House M

Lengths, 5.8, 4.1, 4.7, 4.3 cm.; widths at shoulder, 2.3, 1.7, 1.9, 2 cm.

(b) Diagonal notched, expanding stem narrower than shoulder, base slightly convex, edges either slightly convex or straight with slightly flaring barb. 6

From Pit Houses H, L, N, P, stripping around Pit House I

Lengths: maximum, 3.8 cm.; minimum, 3 cm.; average, 3.6 cm.

Widths: maximum, 2.1 cm.; minimum, 1.6 cm.; average, 1.8 cm.

Thicknesses: maximum, 0.5 cm.; minimum, 0.3 cm.; average, 0.4 cm.

(c) Short, leaf-shaped with convex edges, and convex or slightly convex bases 5

From Pit Houses I, M, N, O, Surface House 3

Lengths, 3.4, 4.7, 2.4, 2.2, 2.6 cm.; widths, 2, 2.5, 1.4, 1.6, 1.2 cm.; thicknesses, 0.4, 0.5, 0.3, 0.3, 0.5 cm.

(d) Roughly leaf-shaped, upper portion of edges slightly convex, basal portion straight, base straight; one with concave base 3

From Pit House N and stripping around I, N

Lengths, 3.3, 2.7, 3.9 cm.; widths, 1.6, 1.3, 1.6 cm.; thicknesses, 0.4, 0.3, 0.5 cm.

(e) Points with straight or slightly convex edges, expanding bases wider than the shoulder and shallow lateral notches, surfaces flattish 3

From Pit Houses M, N, Surface House 3

Lengths, 3.8, 3.9, 3.7 cm.; widths, 1.6, 1.5, 1.5 cm.; thicknesses, 0.4 cm.

(f) Diagonal notched stemmed points with expanding base as wide as shoulder; edges convex, base straight 2

From Pit House P, Surface House 3

Lengths, 2.5, 2.8 cm.; widths, 1.6 cm.; thicknesses, 0.3, 0.5 cm.

(g) Small slender lateral notched with slightly expanding stem, narrower than shoulder; edges straight or slightly convex 2

From Pit House N

Lengths, 3.5, 2.5 cm.; widths, 1.2, 0.9 cm.; thicknesses, 0.4, 0.5 cm.

(h) Crude thick points, roughly leaf-shaped with convex edges and bases, and shallow lateral notches 2

From Pit House O, stripping around Pit House I

Lengths, 4.4, 4 cm.; widths, 1.4, 2 cm.; thicknesses, 0.5, 0.9 cm.

(i) Lateral notched, with unusually convex edges and convex base 1

From Surface House 3

Length, 4.3 cm.; width, 2.8 cm.; thickness, 0.7 cm.

(j) Long, slender, finely chipped point with slightly convex edges and straight stem, base broken off 1

From Pit House J

Length, 6.5 cm.; width, 1 cm.; thickness, 0.3 cm.

(k) Fragments; tips with convex edges, and basal portions, with slightly convex bases without notches

Materials: obsidian, chert, flint, jasper

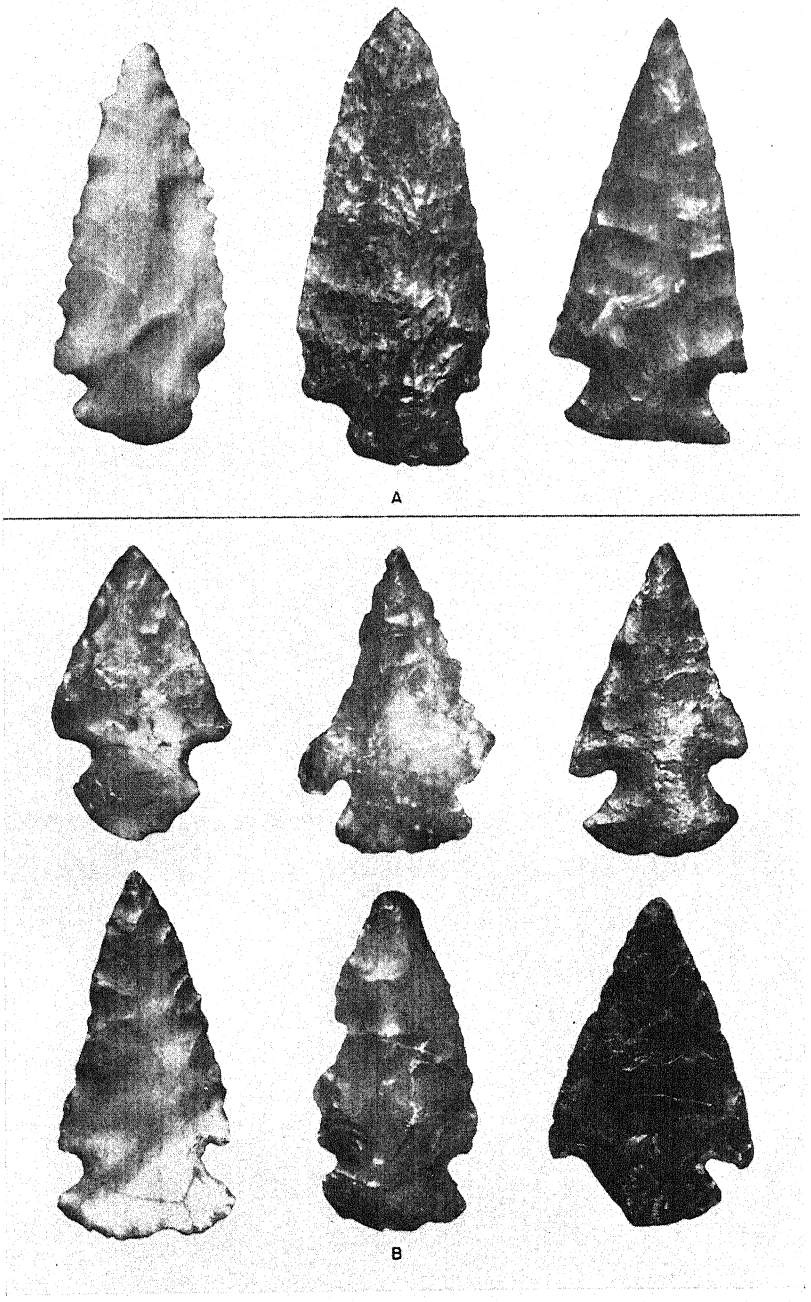


FIG. 72. Projectile points (types a, b). Scale 1:3.

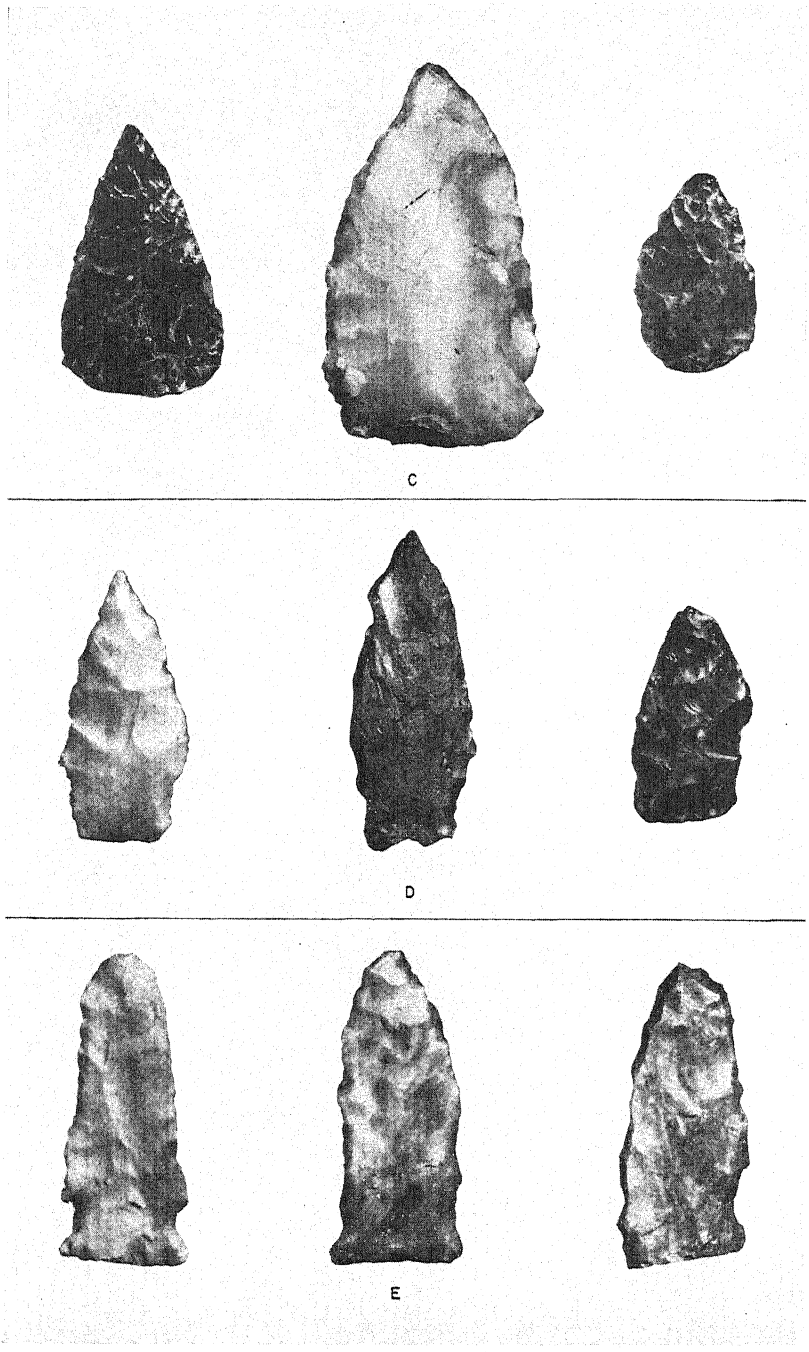


FIG. 73. Projectile points (types c–e). Scale 12:11.

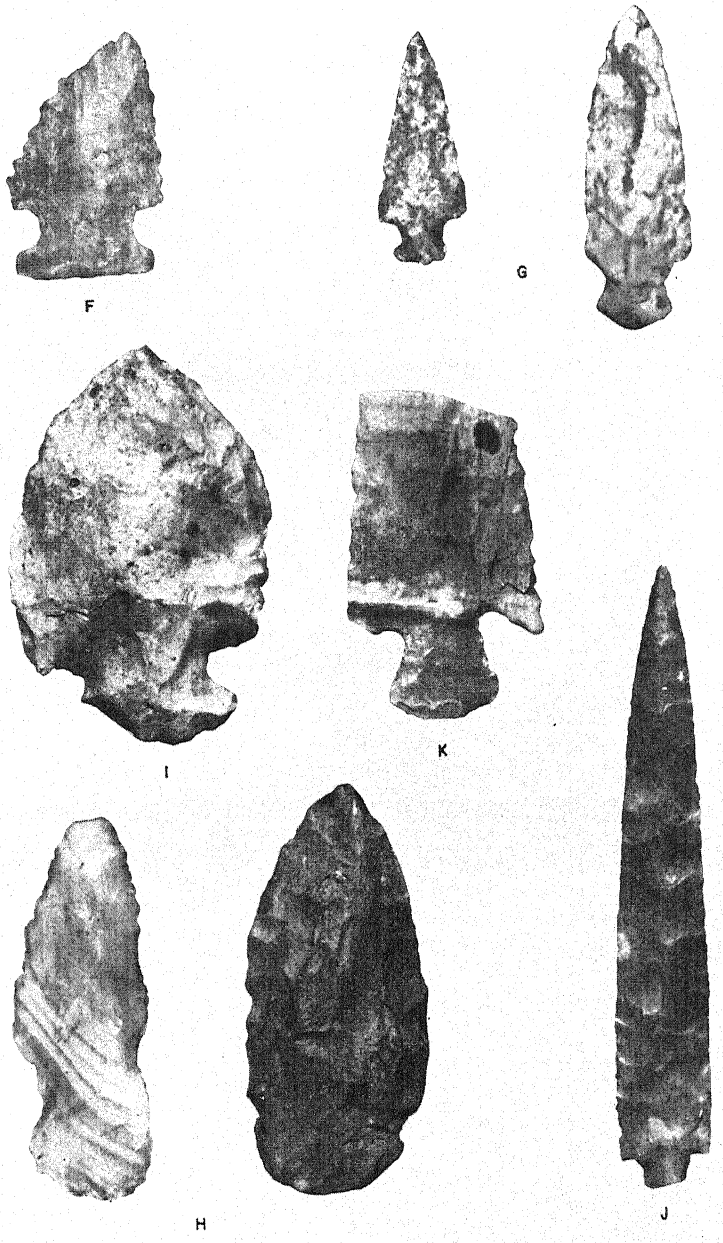


FIG. 74. Projectile points (types f–k). Scale 13:10.

KNIVES

(Fig. 75)

(a) Random flakes; any convenient suitable thin flake slightly chipped along one edge, upper surface frequently made flat by the removal of long thin flakes; lower surface slightly concave, unaltered..... 42

From Pit Houses H, I, L, M, N, O, P, Surface Houses 2 and 3, stripping around I, N; Test Trench 27

Length: maximum, 5.7 cm.; minimum, 1.6 cm.; average, 2.8 cm.

Width: maximum, 3 cm.; minimum, 1.3 cm.; average, 1.5 cm.

Thickness: maximum, 0.7 cm.; minimum, 0.1 cm.; average, 0.5 cm.

(b) Thin concavo-convex flakes; convex surface and one end of concave surface modified by secondary chipping; remainder of concave surface unaltered. 3

From Pit Houses H, L

Lengths, 2.7, 3.1, 3.1 cm.; widths, 2.1, 2.5, 2 cm.; thicknesses, 0.3 cm.

(c) Blades with curved edges and secondary chipping on all major surfaces.. 4

From Pit Houses H, L, N, stripping around Pit House I

Lengths, 4.1, 3.8, 4.3, 2.6 cm.; widths, 2.4, 1.6, 2.1, 1.5 cm.; thicknesses, 0.8, 0.6, 0.6, 0.5 cm.

Materials: obsidian, chert, flint, jasper

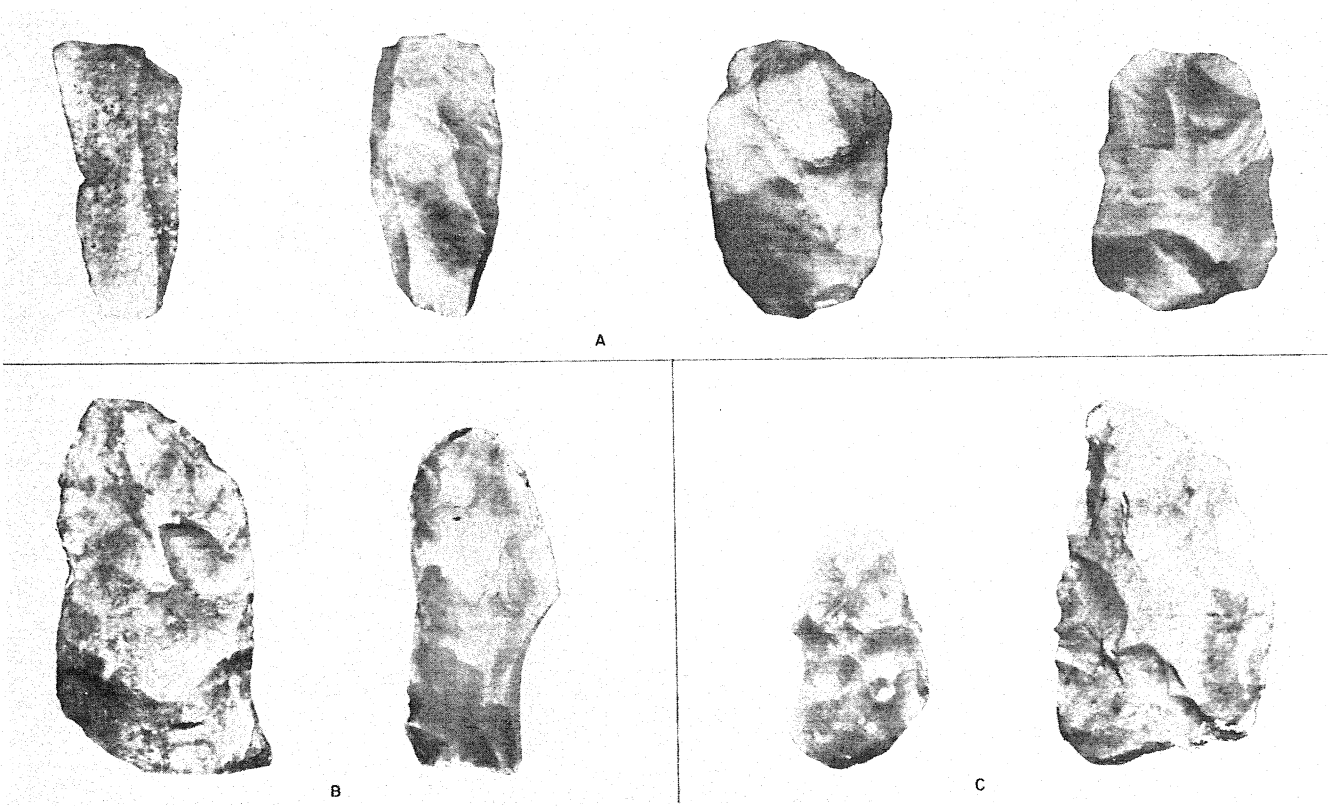


FIG. 75. Knives (types a–c). Scale 11:9.

SCRAPERS

(Figs. 76–78)

(a) Convenient thick flakes with secondary chipping along one or more edges; edges frequently curved..... 68

From Pit Houses H, I, L, M, N, O, P, Surface Houses 2 and 3, stripping around Pit House N, Surface House 3; Test Trench 27

Length: maximum, 6.8 cm.; minimum, 2.4 cm.; average, 4.2 cm.

Width: maximum, 5.2 cm.; minimum, 1.6 cm.; average, 3 cm.

Thickness: maximum, 1.7 cm.; minimum, 0.5 cm.; average, 1.1 cm.

(b) Large scrapers; large, rough, thick, angular flakes with pressure chipping along one edge; plano-convex in cross sections; original cleavage surfaces unaltered except on edges..... 9

From Pit Houses I, J, M, N, O

Length: maximum, 10.9 cm.; minimum, 6.1 cm.; average, 7.6 cm.

Width: maximum, 8.2 cm.; minimum, 4.7 cm.; average, 5.7 cm.

Thickness: maximum, 3.1 cm.; minimum, 1.8 cm.; average, 2.4 cm.

(c) End scrapers; oblong concavo-convex flakes, with steep retouch along one end; upper surface slightly flattened by the removal of long thin flakes, concave lower surface unaltered..... 4

From Pit Houses N, O, P

Lengths, 2, 3.8, 3.7, 3.7 cm.; widths, 1.9, 2.3, 2.1, 1.4 cm.; thicknesses, 0.7, 1.4, 0.6, 0.5 cm.

(d) Thick roundish nodules, plano-convex in cross section with deep notches, sides steeply chipped, forming serrate edges..... 2

Pit House I

Lengths, 4.7, 4.3 cm.; widths, 4.5, 3.4 cm.; thicknesses, 2.4, 1.9 cm.

(e) Thick plano-convex flakes with one or more edges steeply and deeply chipped, forming a serrate edge..... 3

From Pit Houses M, N, stripping around Pit House N

Lengths, 2.7, 3.2, 4.7 cm.; widths, 2.5, 2.4, 2.1 cm.; thicknesses, 0.9, 0.6, 0.5 cm.

(f) Thick keel-shaped implements, roughly leaf-shaped in outline, with secondary chipping on convex surface and at broad end of plane surface; narrow end of plane surface unaltered..... 2

From Pit Houses H, J

Lengths, 5.8, 6.6 cm.; widths, 3.1, 3.9 cm.; thicknesses, 2.3, 1.6 cm.

(g) Thick concavo-convex flakes, roughly pear-shaped in outline, with pressure chipping on convex surface and edges, chipped from both sides on edges..... 3

From Pit House P, and stripping around Pit House N

Lengths, 4.8, 4.6 cm. (fragment); widths, 2.8, 2.7, 2.5 cm.; thicknesses, 1.2, 1.9, 1.2 cm.

(h) Thick concavo-convex flakes with one inward curving edge chipped through use; other surfaces unaltered..... 5

From Pit Houses J, M, Surface House 2

Lengths, 4.2, 4, 5.2, 4.8, 4.5, 4.4 cm.; widths, 1.6, 3, 3.3, 1.5, 2.1, 1.6 cm.; thicknesses, 1, 0.5, 1.5, 0.6, 0.9, 0.5 cm.

(i) Thin plate-like stone with one chipped edge ground fairly smooth..... 1

From Pit 5

Length, 8.8 cm.; width, 7 cm.; thickness, 0.8 cm.

Materials: rhyolite, chert, flint, jasper, basalt, obsidian

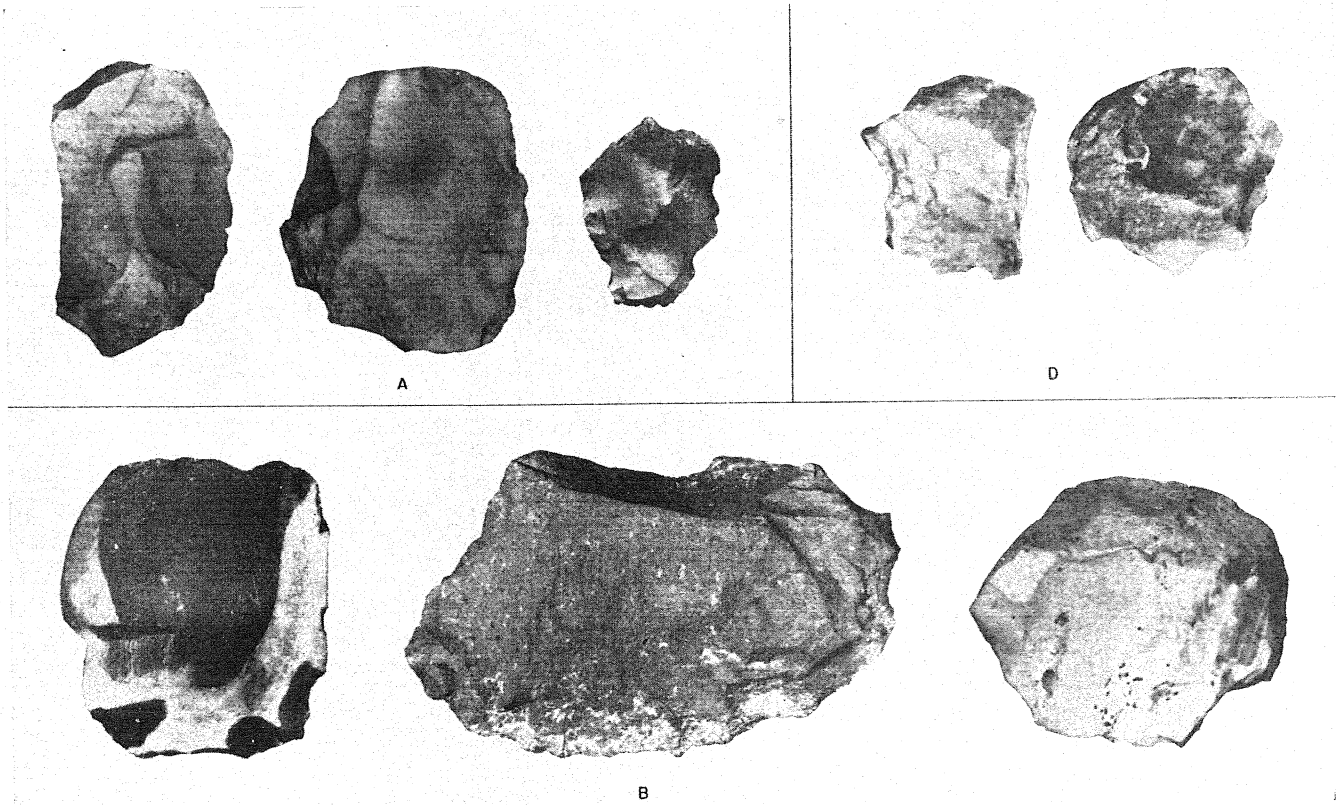


FIG. 76. Scrapers (types a, b, d). Scale 5:8.

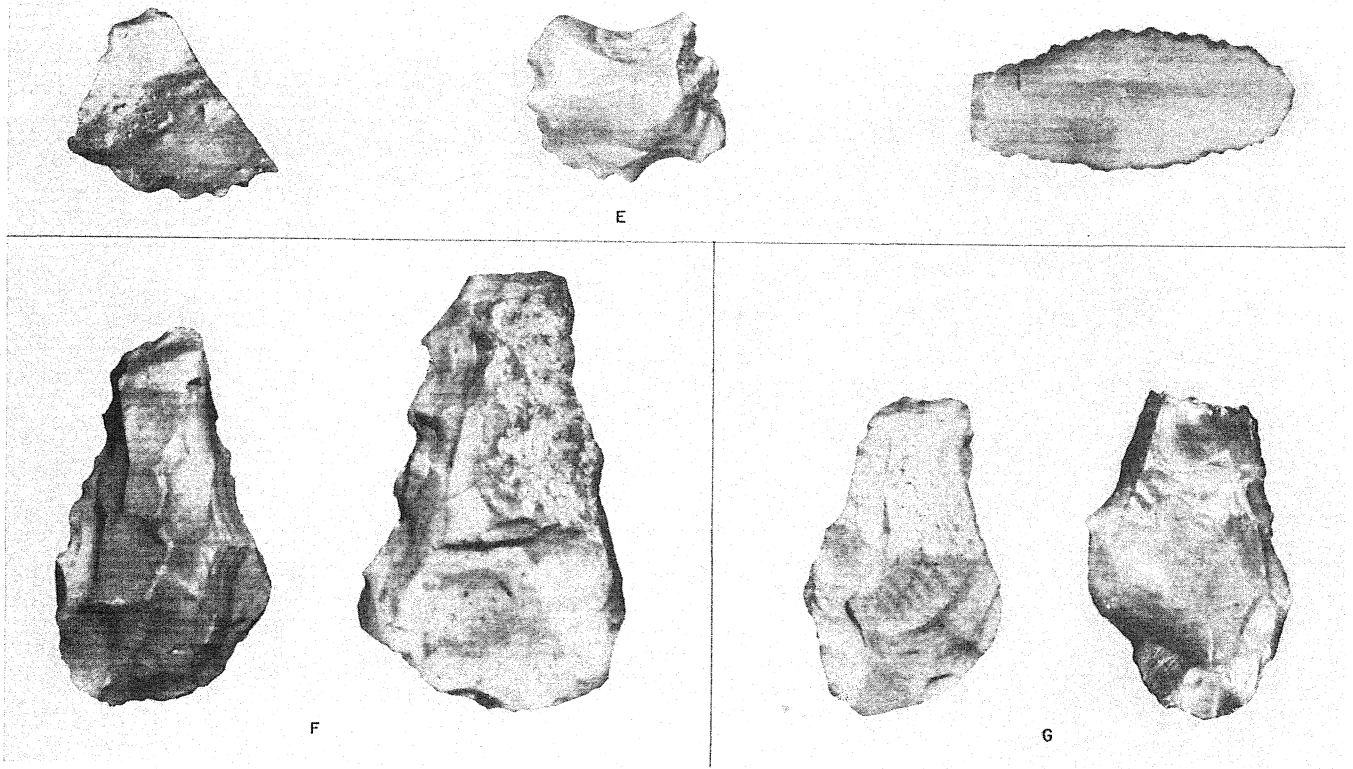
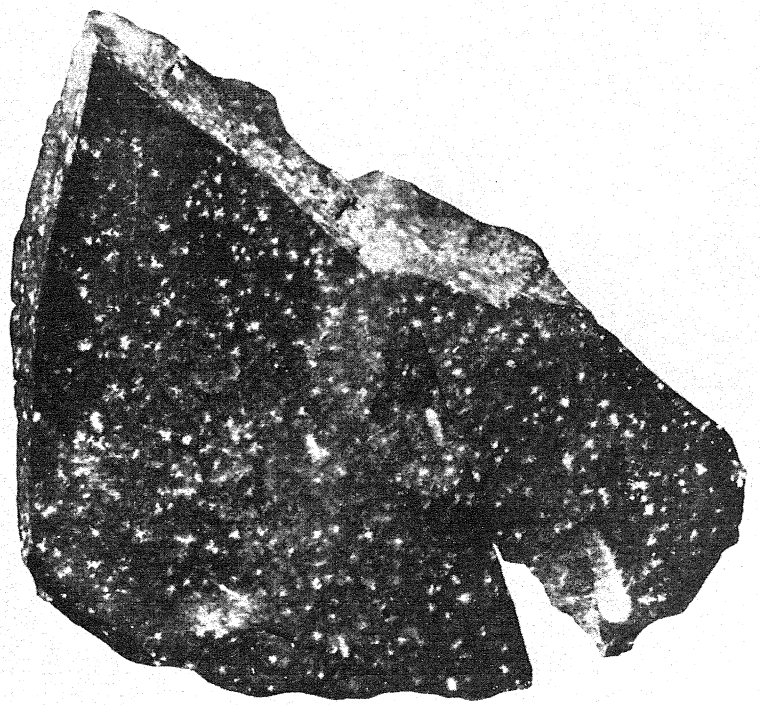


FIG. 77. Scrapers (types e–g). Scale 11:12.



I

H

FIG. 78. Scrapers (types h, i). Scale 6:5.

CHOPPERS

(Figs. 79, 80)

Large angular core implements, one or more sides flaked to sharp cutting edge, frequently plano-convex in cross section, occasionally part of the original crust left intact 12

From Pit Houses I, L, N, O, P, Surface House 3, Test Trench 27, stripping around Surface House 3

Length: maximum, 12.5 cm.; minimum, 6 cm.; average, 8.5 cm.

Width: maximum, 10.3 cm.; minimum, 5 cm.; average, 7 cm.

Thickness: maximum, 5.2 cm.; minimum, 3.5 cm.; average, 4.9 cm.

Materials: chert, diorite, basalt

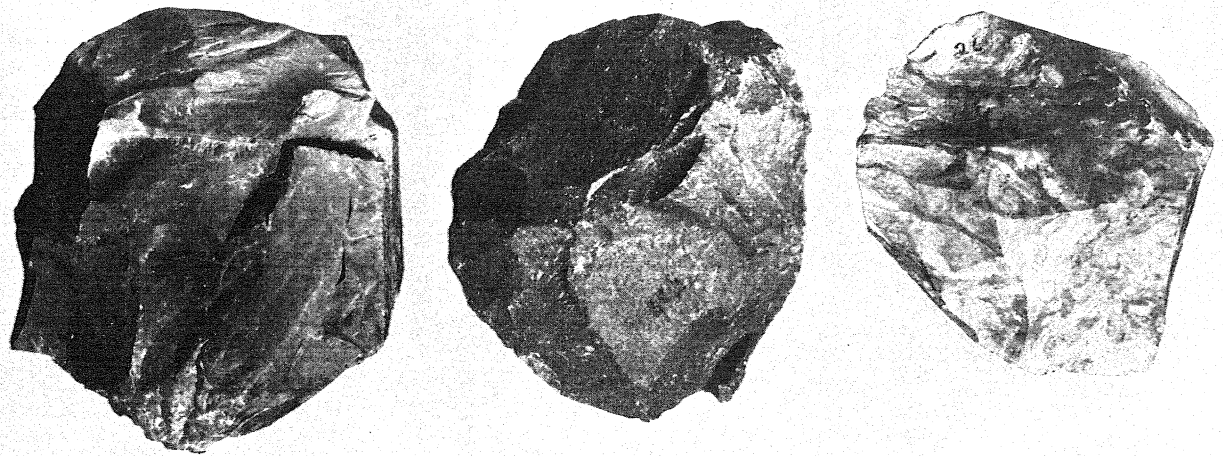


FIG. 79. Plano-convex choppers. Scale 5:8.

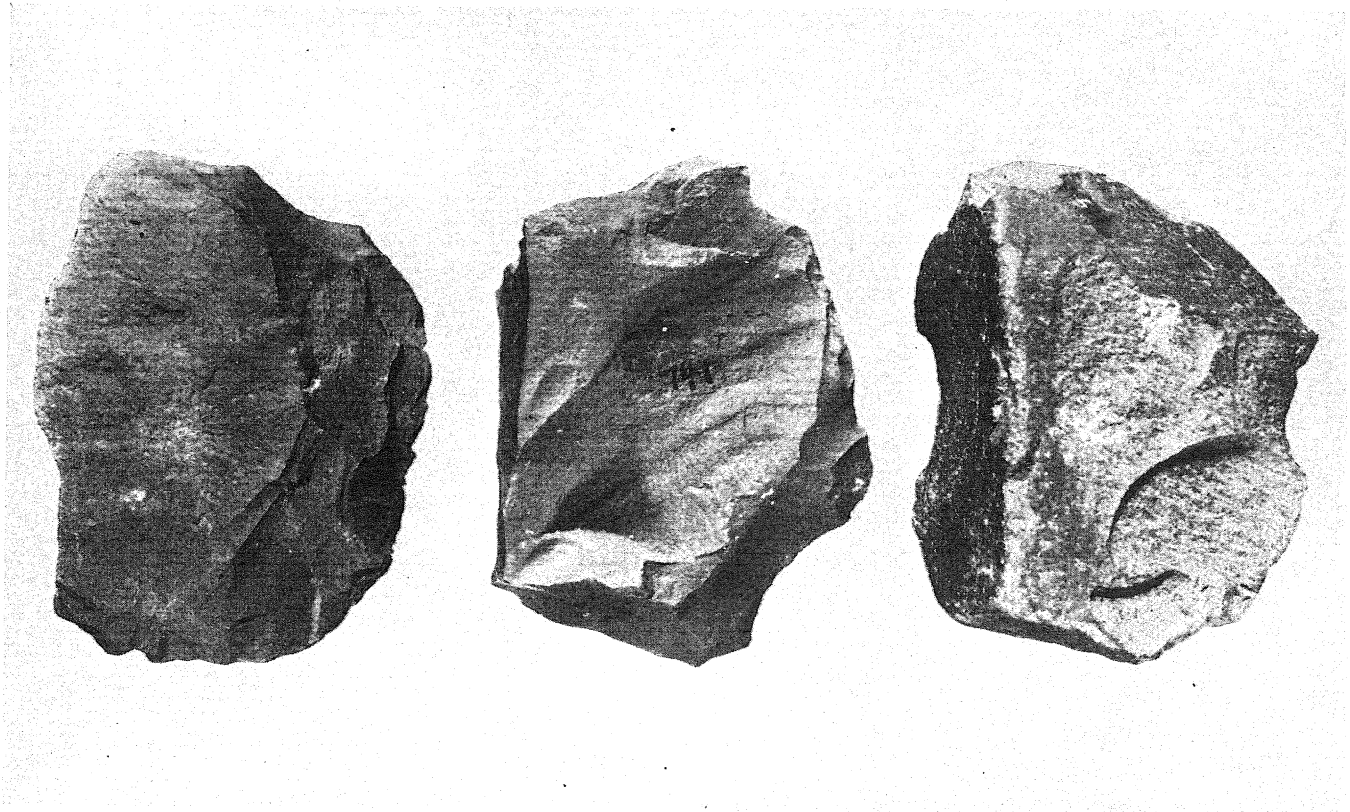


FIG. 80. Biface choppers. Scale 13:15.

PENDANTS

(Fig. 81)

(a) Zoomorphic image, carved in round, head crested, hole drilled through body for suspension..... 1
From Pit House I
Length, 2.5 cm.; width, 1.1 cm.; height, 1.7 cm.
Material: fluorite

(b) Zoomorphic form, one end grooved, collar in low relief..... 1
From Pit House I
Length, 3.4 cm.; width, 0.8 cm.; height, 1.3 cm.
Material: limestone

(c) Fragment of mica disk(?) with small hole at top, drilled from both sides.. 1
From Surface House 2
Width: 2.4 cm.

POLISHED STONE AND SHELL BEADS

(Fig. 81)

(d) Thick disk-shaped stone bead with central perforation..... 1
From Surface House 3
Diameter, 1.3 cm.; thickness, 0.5 cm.

(e) Truncated base of olivella shells used as beads..... 68
From Surface House 3 with burials
Diameter: 1 cm.

(f) Olivella shell with spire cut off for stringing..... 1
From Surface House 2, with Burial 39
Length, 1.3 cm.; width, 0.7 cm.

BONE DISK

(Fig. 81)

(g) Small charred bone disk, possibly unfinished button, bead or die..... 1
From Surface House 2
Diameter: 1.4 cm.

DRILLS

(Fig. 81)

(h) Pointed flake shaped by longitudinal flaking, with secondary chipping on point..... 1
From Pit House P
Length, 3.2 cm.; width, 1.5 cm.; thickness, 0.5 cm.

(i) Basal fragment of drill; broad base tapering gradually to shaft (tip broken off)..... 1
From Surface House 2
Width, 2 cm.; thickness, 0.5 cm.

(j) Wide rounded flange tapering fairly abruptly to shaft..... 1
From Test Trench 27
Length, 5.3 cm.; width, 2 cm.; thickness, 0.8 cm.

Materials: flint, chert

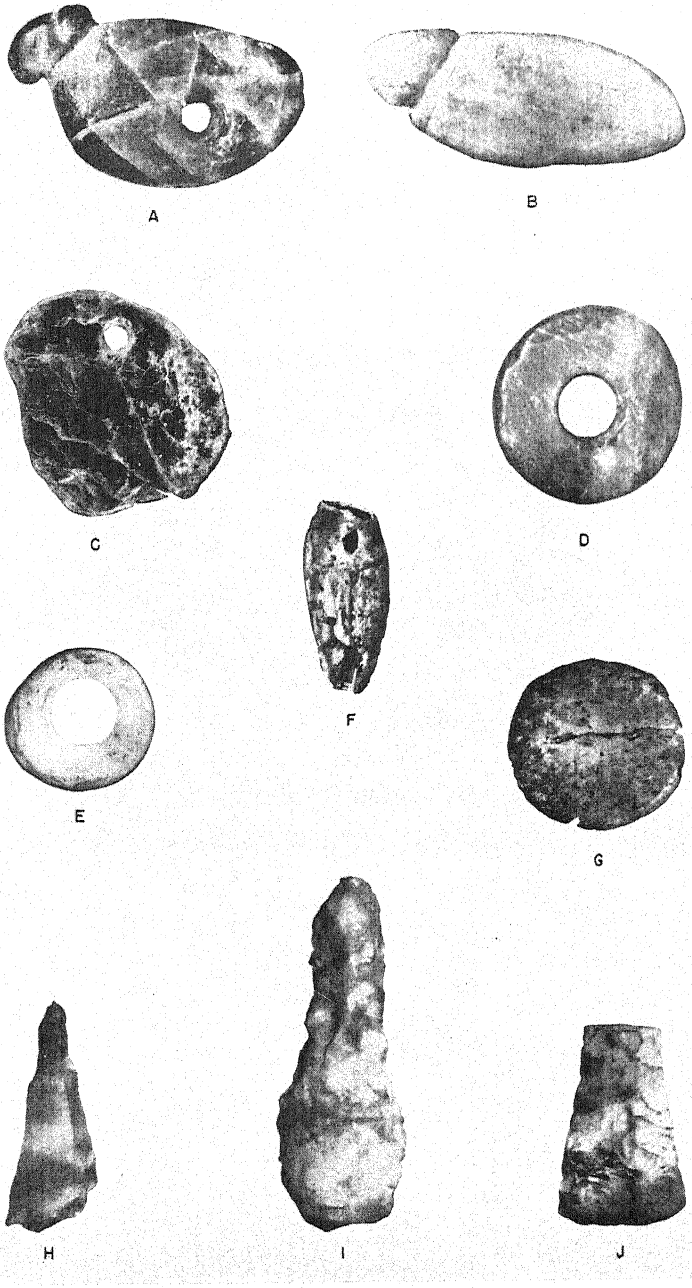


FIG. 81. Drills (h–j), pendants, beads, and bone disk. Scale: a–c, 11:6; d–g, 17:9; h–j, 11:12.

POT COVER

(Fig. 82, upper left)

Round, thin disk; all edges chipped; one surface flat, smooth, other surface fairly smooth 1

From Surface House 3, stripping

Diameter: 8.3 cm.

Material: porphyritic basalt

HOES

(Fig. 82)

Thin natural plates of stone, roughly oblong in outline with one end broader than the other; edges chipped and rounded through use 3

From stripping around Pit Houses L, P, and Surface Room 3

Lengths (fragments), single complete specimen, 22 cm.; widths, 3.5, 5.5, 9.1 cm.; thicknesses, 1.5, 1.2, 0.8 cm.

Material: porphyritic basalt

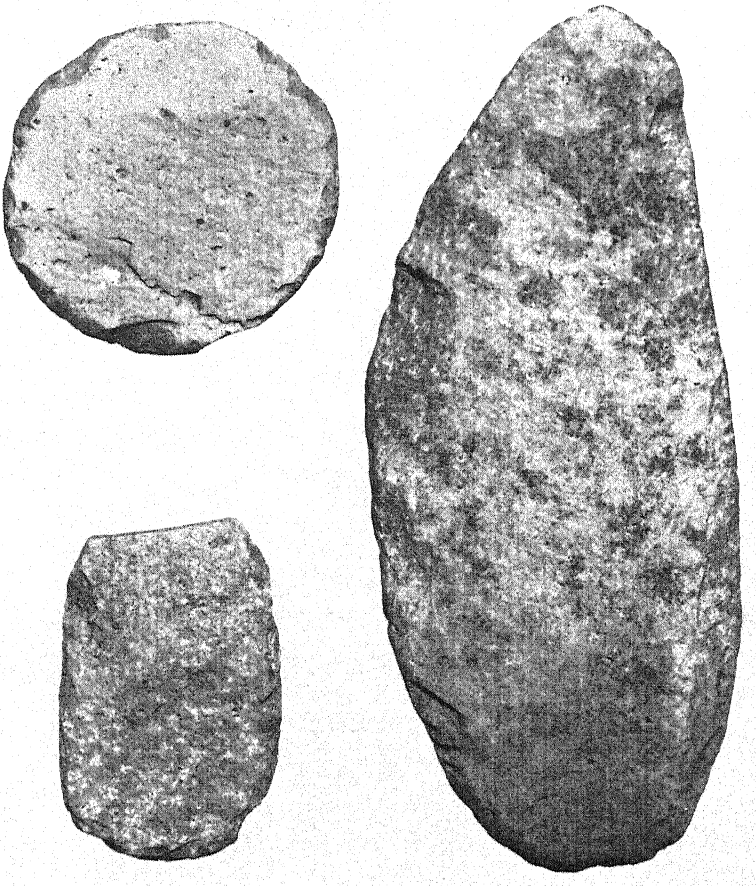


FIG. 82. Pot cover (upper left) and hoes. Scale 1:2.

BONE FLAKERS

(Fig. 83)

(a) Split bone, head partially removed, tip broken off, remainder of pointed end showing that it was ground and tapered to a point and then became beveled through use as a flaker 1

From Surface House 2

Length: 13.3 cm.

(b) Quartered bone, head wholly removed, tip of pointed end broken off, remainder showing characteristic bevel from use as flaker 1

From Pit House I

Length: 15.2 cm.

(c) Fragment, tip of flaker which has been cut to point and beveled through use 1

From Pit House N

Length: 4.6 cm.

BONE NEEDLES

(Fig. 83)

(a) Flat section of split long bone, ground and polished smooth, small hole drilled at blunt end for eye; eyes drilled from both sides on two specimens, one side on two specimens, all like bodkins in form, tips dull, flat, rounded 4

From Pit House I

Lengths: 11.6, 13, 13, 17.6 cm.

(b) Flat section of split long bone, all surfaces ground and polished, tips dull, flat, rounded, like bodkins, but lacking eyes 2

From Pit House I

Lengths: 16.5, 17 cm.

BONE END SCRAPER

(Fig. 83)

Spatula-like in form, made from split long bone, inner surfaces and ends beveled off to form squarish sharp edge 1

From Pit House I

Length: 11.7 cm.

BONE PIPE-STEM

(Fig. 71)

Found with stone pipe in Surface House 2 1

Length, 3.1 cm.; width, 1.3 cm.

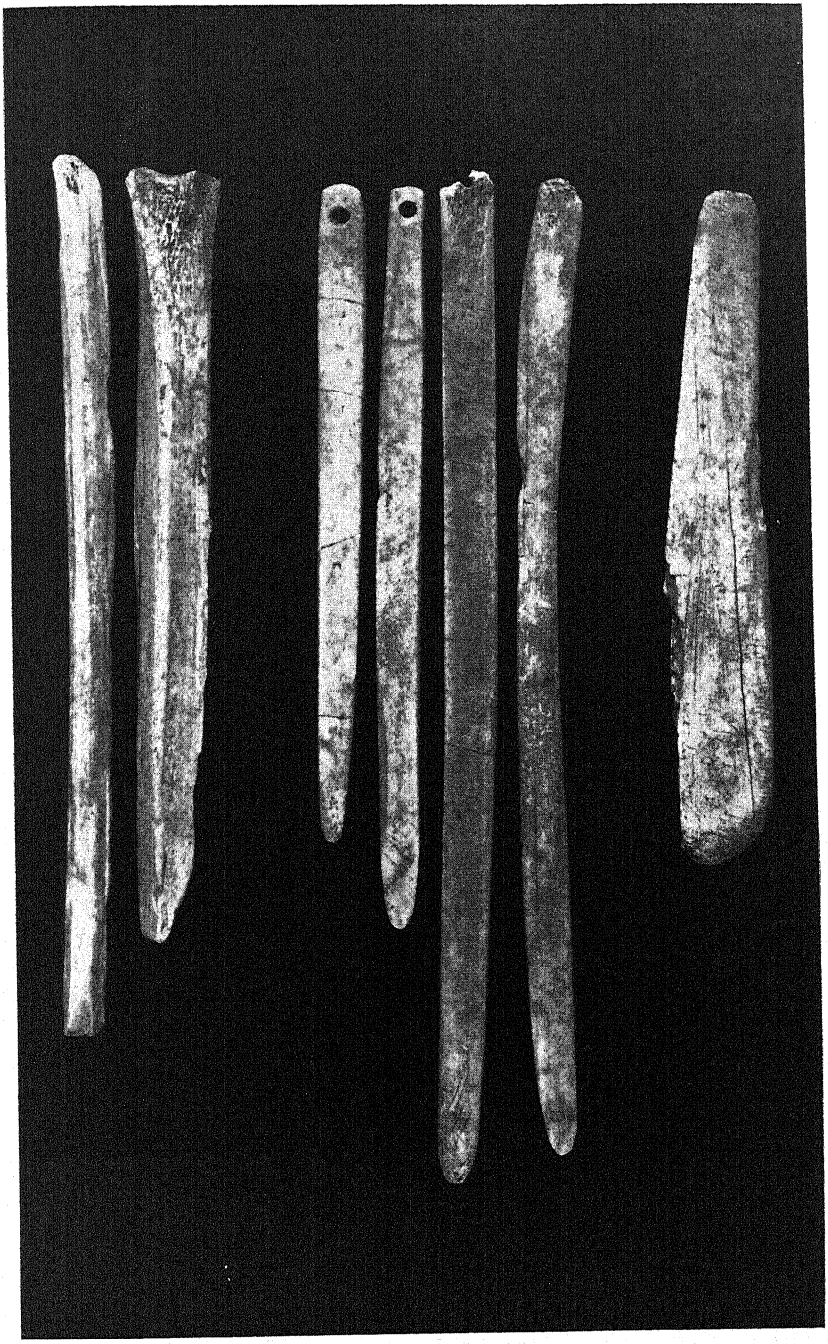


FIG. 83. Bone flakers, bone needles, and bone end scraper (left to right). Scale 3:4.

BONE AWLS

(Fig. 84)

(a) Head of bone unworked except by original splitting, other end ground and polished to sharp point, six with side notch made from bones split in half..... 12

From Pit Houses I, L, P, Surface House 2, stripping around Pit House N

Length: maximum, 23.7 cm.; minimum, 9.7 cm.; average, 14.7 cm.

(b) Quartered split bone, head almost wholly removed, other end ground, polished and tapered to point..... 6

From Pit House I, Surface House 2

Length: maximum, 17.9 cm.; minimum, 9.4 cm.

(c) Quartered split bone, head partly removed, other end ground and polished to point..... 3

From Pit Houses I, N, P

Lengths: 15.7, 11.4, 8.6 cm.

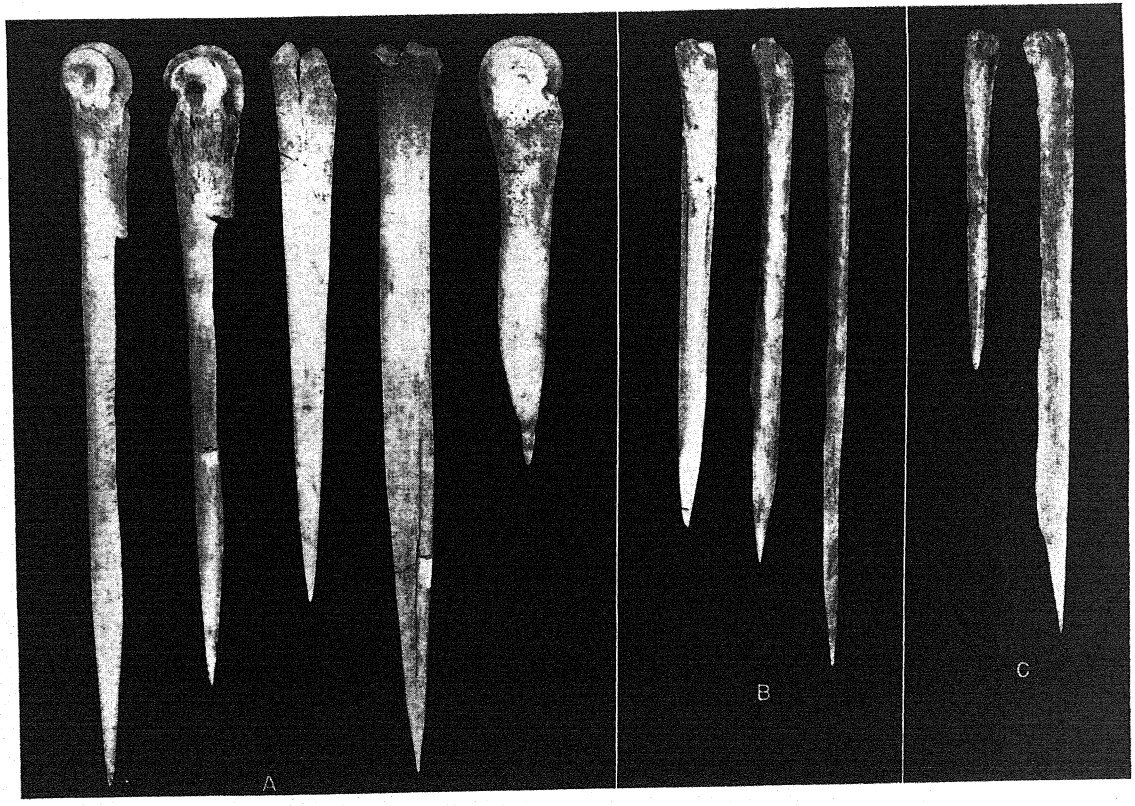


FIG. 84. Bone awls (types a–c). Scale 9:17.

BONE AWLS

(Fig. 85)

(d) Head of bone intact, other end ground and polished to point (made from deer ulnas) 2

From Pit Houses M, P

Lengths: 21.1, 13.3 cm.

(e) Split bone, head removed, cut off squarely, other end ground and polished to sharp point 1

From Surface House 2

Length: 11.5 cm.

(f) (?)Fragments of bone awls, mostly sharp tips, possibly made from bone splinters 5

From Pit Houses I, J, N, Surface Houses 2 and 3

Material: deer (*Odocoileus* sp.) metacarpals

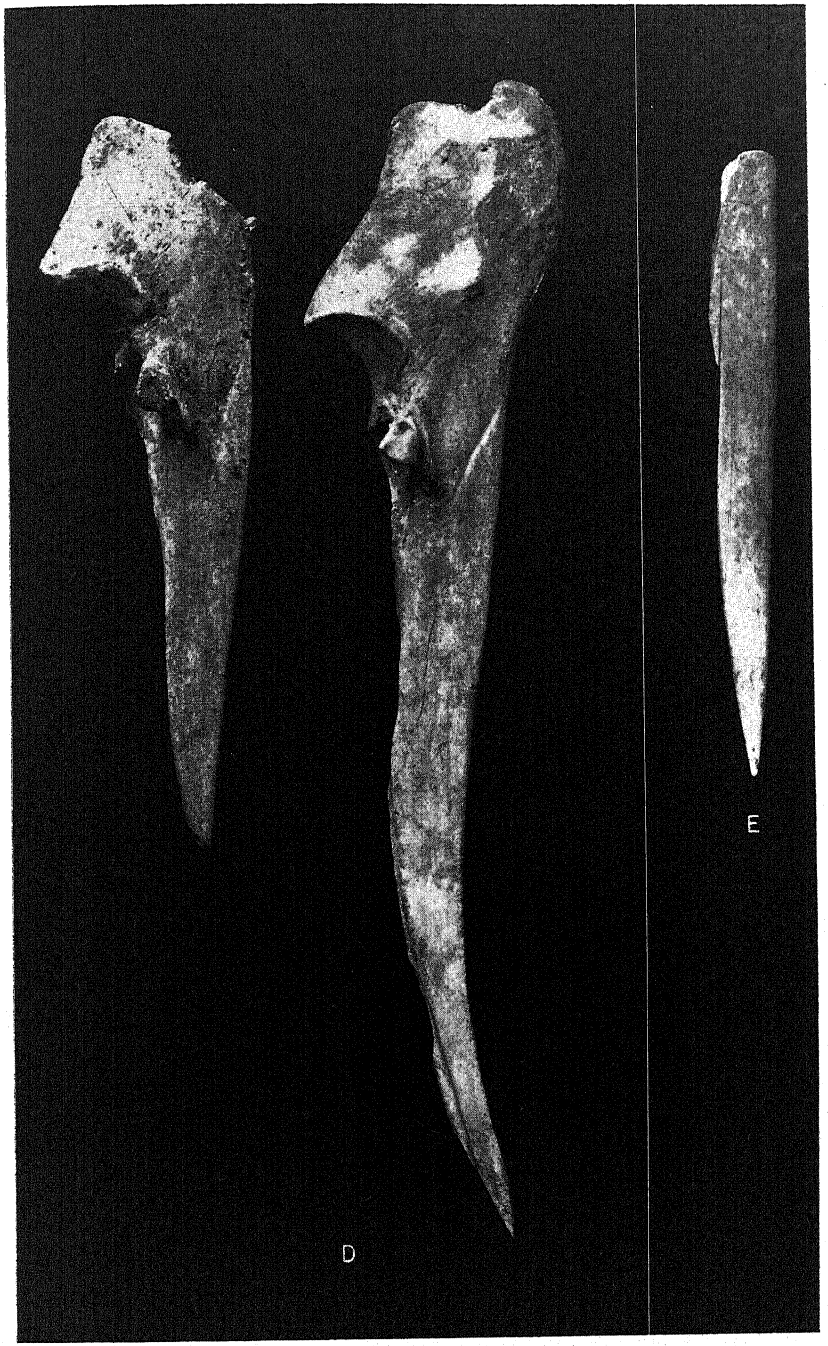


FIG. 85. Bone awls (types d and e). Scale 3:4.

WORKED SHERDS

(Fig. 86)

(a) Small pottery disks with edges ground smooth..... 53

From Pit Houses H, I, J, L, M, N, O, P, Surface Houses 2 and 3, stripping around Pit Houses I, M; Test Trench 27

Diameters: maximum, 4.6 cm.; minimum, 2 cm.; average, 3.5 cm.

Thicknesses: maximum, 0.9 cm.; minimum, 0.5 cm.; average, 0.7 cm.

Materials: Alma Plain, Alma Rough, San Francisco Red

(b) Worked sherds of irregular shape, edges ground smooth, two perforated, four with start of perforation near center..... 16

From Pit Houses H, L, N, O, P, Surface House 3, stripping around Pit Houses I, M

Lengths: maximum, 7.1 cm.; minimum, 2.8 cm.

Widths: maximum, 6 cm.; minimum, 1.6 cm.

Thicknesses: maximum, 0.9 cm.; minimum, 0.5 cm.

Materials: Alma Plain, San Francisco Red

(c) Rectangular worked sherds with edges ground smooth and corners rounded off..... 9

From Pit Houses N, O, P, Surface House 3

Lengths: maximum, 4 cm.; minimum, 2.4 cm.; average, 2.8 cm.

Widths: maximum, 4 cm.; minimum, 2.1 cm.; average, 2.5 cm.

Thicknesses: maximum, 0.7 cm.; minimum, 0.5 cm.; average, 0.7 cm.

Materials: Alma Rough, Alma Plain, San Francisco Red

(d) Oval shape with edges ground smooth..... 4

From Pit Houses N, P, Surface House 2, stripping around Pit House N

Lengths, 4.3, 3.4, 3, 3.3 cm.; widths, 2.7, 2.5, 2.2, 2.2 cm.; thicknesses, 0.7, 0.5, 0.8, 0.7 cm.

Materials: Alma Plain, San Francisco Red

(e) Keystone-shaped sherds with edges ground smooth, too flat for scoops.... 2

From Pit Houses I, J

Lengths, 2.2, 2.5 cm.; widths, 2, 1.7 cm.; thicknesses, 0.5, 0.6 cm.

Materials: San Francisco Red, Alma Plain

(f) Seven sherds found which had one or more drilled holes; four in which hole had been started. These showed no ground edges or other signs of alteration. Perforation made by drilling from one side in all except two instances, and mostly from convex side of sherd. The majority of worked sherds from San Francisco Red and Alma Plain; a very few from Alma Rough..... 11

(g) Half of a rough concave pottery disk decorated on the convex side with punctate dots; perforation through center..... 1

From Pit House N

Diameter, 4 cm.; thickness, 0.3 cm.

Material: baked clay

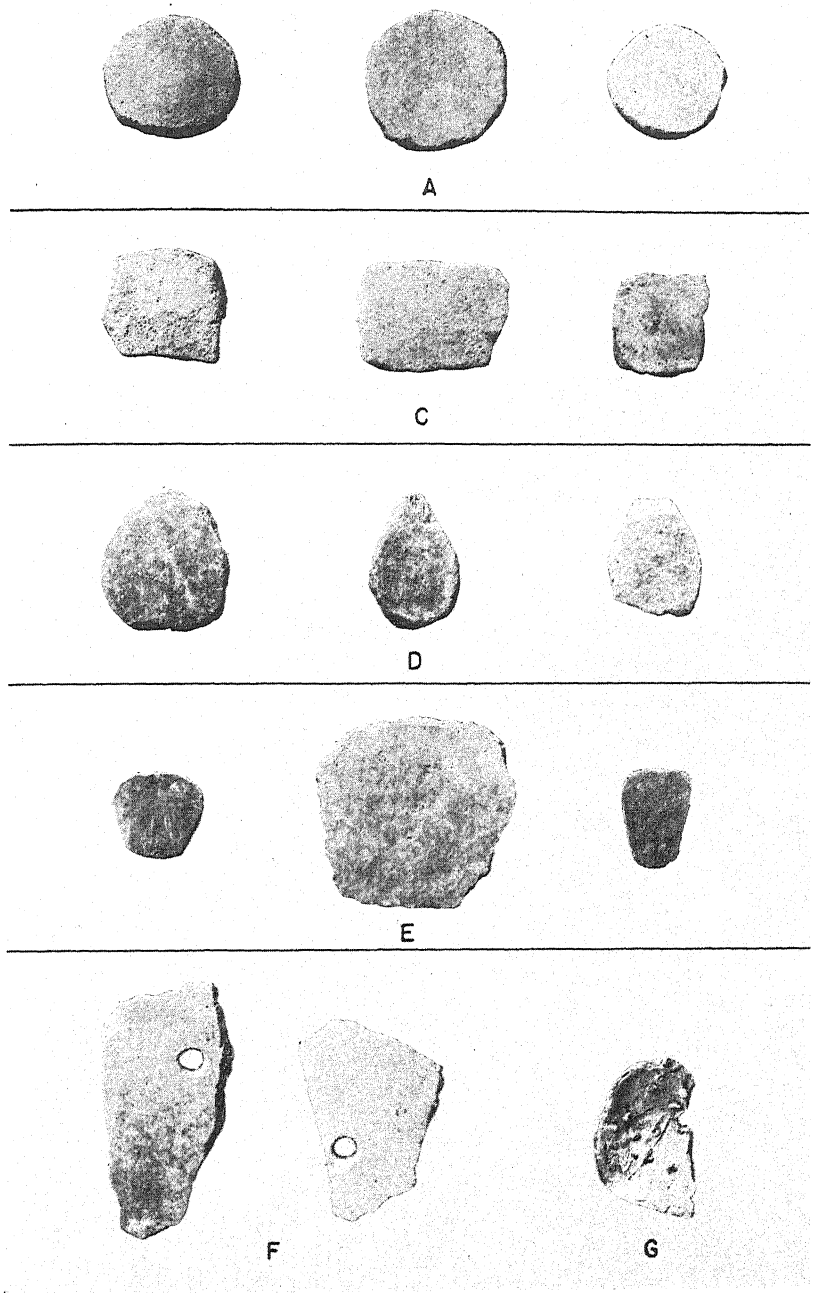


FIG. 86. Worked sherds (types a, c–g). Scale 4:7.

POTTERY PIPE

(Fig. 87, upper left)

Fragment of "Cloudblower" type, funnel shape, greatest diameter at bowl end; tapering from bowl to stem end; minute hole at stem end; bowl and stem in one piece, lightly polished..... 1

From Pit House L

Length, 3.5 cm.; diameter of bowl, 2.5 cm.

CLAY FRAGMENTS OF FIGURINES(?)

(Fig. 87, upper right)

(a) Lower end(?) of figurine; clay object of rounded rectangular form, having one surface decorated with vertical incised lines alternating with vertical rows of punctate dots, one horizontal line encircling lower end of object..... 1

From Pit House L

Width, 2.5 cm.; thickness, 0.9 cm.

(b) Forked lump of clay, possibly legs of figurine, or forked ladle handle..... 1

From Pit House N

Width, 2.8 cm.; thickness, 1.5 cm.

MINIATURE LADLES

(Fig. 87, lower row)

Fragments of bowls, and handles of miniature ladles, bowl portion generally roundish, shallow; handles rod-like, occasionally flattish on upper and lower surfaces; no complete specimens..... 10

From Pit Houses J, L, N, O, Surface Houses 2 and 3, stripping around Pit House H

Material: baked clay (Alma Rough, Alma Plain)

FIG. 87. Clay pipe and figurine(?) fragments (upper row) and miniature ladle fragments (lower row). Scale 17:19.

UNWORKED STONE

(Not illustrated)

Pigments

Lumps of azurite, malachite, limonite, hematite..... 9
From Pit House L

Crystals

Quartz crystals..... 7
From Pit Houses M, N, P, Test Trench 27, Surface House 3, stripping around Surface House 3

Petrified wood fragment

From Surface House 3

Obsidian nodules

Small unworked obsidian nodules, too small for use as raw material for scrapers, knives, or projectile points..... 2
From Surface House 3

DATA ON IDENTIFIABLE UNWORKED BONE FRAGMENTS

Odocoileus virginianus(?) (white-tailed deer)
Eighty-two fragments, representing at least thirteen individuals

Meleagris gallopavo (turkey)
Twenty fragments, representing at least five individuals

Canis familiaris(?) (domestic dog)
Thirty fragments, representing at least three individuals

Thomomys sp. (pocket gopher)
One incomplete skull

Citellus grammurus (rock squirrel)
Two fragments (one mandible, one femur)

Unidentified medium-sized bird
Three fragments

Unidentified animal bone fragments

TABLE OF FREQUENCY OF UNWORKED BONE

	Number of fragments	Number of individuals represented	Weight of fragments (oz.)
Deer	82	13+	61
Turkey	20	5+	6
Dog	30	3+	5
Rock squirrel	2	1+	..
Pocket gopher	1	1	..
Unidentified animal bone fragments	73	?	24

VI. POTTERY[1]

Three types of pottery occurred at the SU site, namely, Alma Plain, Alma Rough, and San Francisco Red, Saliz variety. These wares are plain, undecorated, and untextured.

The same three wares or pottery types were excavated in 1939 at the SU site. One, Alma Plain, had already been named. The other two, however, had not, and we felt (in 1939) that naming them then would have been premature. Now that we have such an abundant supply of these two formerly unnamed types, we feel that permanent names may properly be assigned to them. Accordingly, after conferences with Haury, Getty, Rinaldo, and Lehmer, we have decided on the following terminology:

New name	Previous temporary designation
Alma Rough	Unpolished Brown
San Francisco Red, Saliz variety	Polished Red

The name "Alma Rough" was chosen because this terminology fits in with the general style used for all the Mogollon, unslipped, unpainted wares—e.g., Alma Plain, Alma Neck-Banded, and the like. The color, furthermore, of Alma Rough is similar to that of Alma Plain.

San Francisco Red, Saliz variety, is similar, if not identical, with the later classic San Francisco Red, named by Haury (1936b, p. 28). To make it clear, however, that we are not claiming technological or chronological identity with the later, classic San Francisco Red pottery, and yet to avoid having two different names for wares that are genetically and morphologically related, we have added "Saliz variety" to the type name.[2]

Of the 19,644 potsherds recovered, approximately one-half were Alma Plain, one-fourth were Alma Rough, and the remainder, San Francisco Red, Saliz variety.

For details of percentages and distributions, see the tables at the end of this chapter.

Alma Plain

A full description of this type has previously been written by Haury (1936b, p. 32) and others. The Alma Plain of the SU site,

[1] Written in collaboration with Jane Darrow.

[2] "Saliz" is the name of a nearby mountain range.

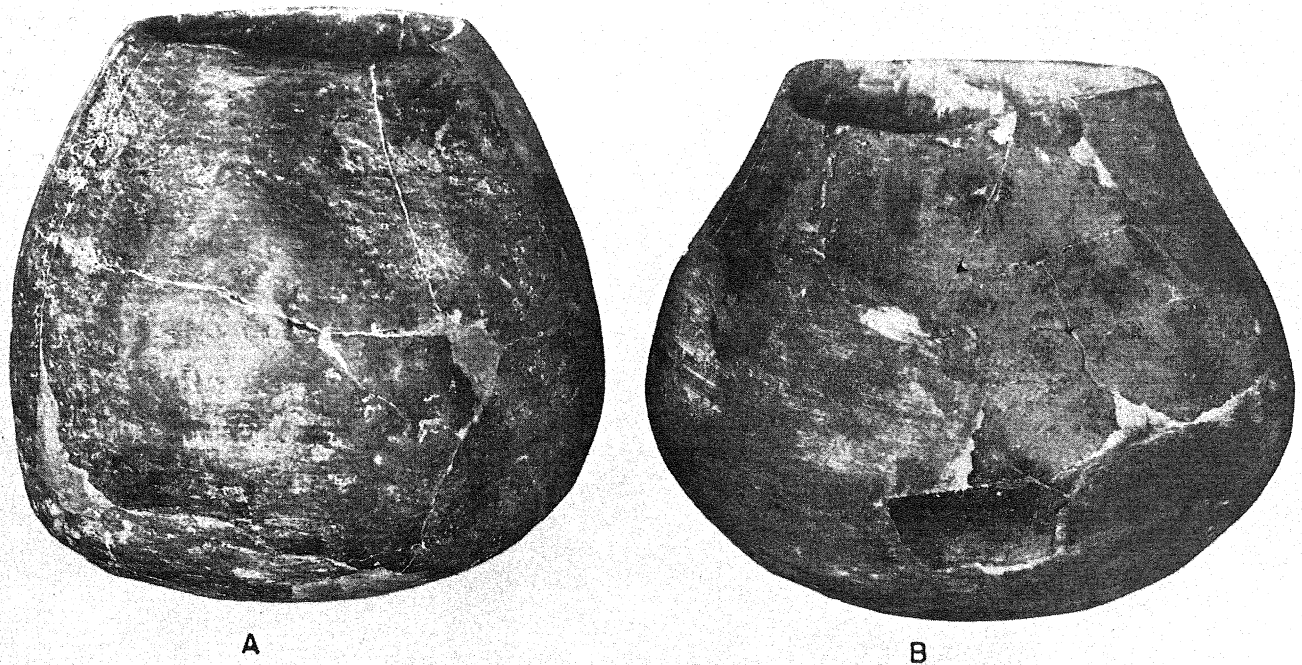


FIG. 88. *a*, Alma Plain barrel-shaped jar, from floor of Pit House M; *b*, Alma Rough jar, from floor of Pit House P. Scale 2:5.

Pine Lawn phase, corresponds with their descriptions in every detail with the possible exception of form. The following forms appear more frequently in this earlier period than they do in later periods: hemispherical bowls, globular jars with and without necks, wide-mouthed jars with flaring rims, narrow-mouthed jars, and barrel-shaped jars (Fig. 88, *a*). This barrel-shaped jar is rare if not unique for Mogollon pottery types.

ALMA ROUGH

(Formerly called Unpolished Brown)

(Upper left, Fig. 35, Martin, 1940; and Fig. 88, *b*)

Paste:

Color: The color of the core, when not uniform throughout, changes from gray to brown about 2 mm. from the surface. Typical color is Cork (12B7);[1] the range is through the browns such as Beaver (15A6) to black.

Inclusions: Coarse, rounded, and angular fragments ranging over 1 mm. in diameter, typically white, silver, and black. The white fragments are dull and opaque, the silver and black highly lustrous.

Texture: Granular and slightly friable, paste heavily tempered.

Fracture: Devious; fragments break off at slight angle to the vessel's surface.

Surface features:

Color: Typical color Cork (12B7), range to lighter browns and tans and to darker browns such as Beaver (15A6), also to gray and black. Fire clouds occur frequently.

Hardness: 3.5–4.5 (Moh's scale).

Evenness: Surfaces are not slipped or polished, but they are smoothed, and the coiling lines are obliterated. They present a matte surface through which the tempering material protrudes. Brush and scraping marks show frequently on the interiors of jars and occasionally on the exteriors.

Texture: Slightly granular; uneven. No intentional scoring or texturing.

Luster: Dull.

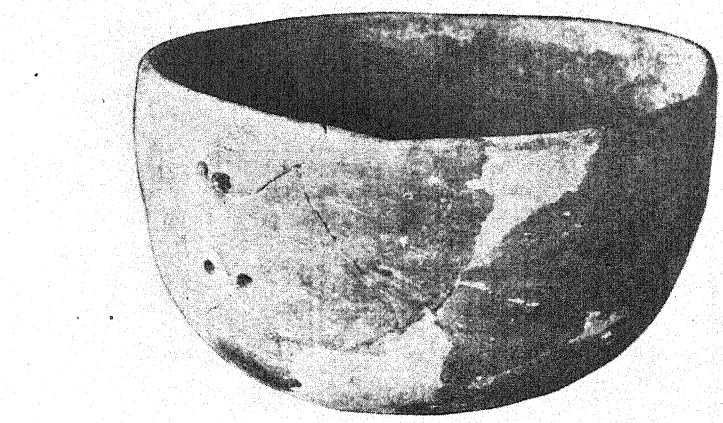
Slip: None.

Thickness of vessel walls: 5 mm. to 14 mm., average 7 mm.

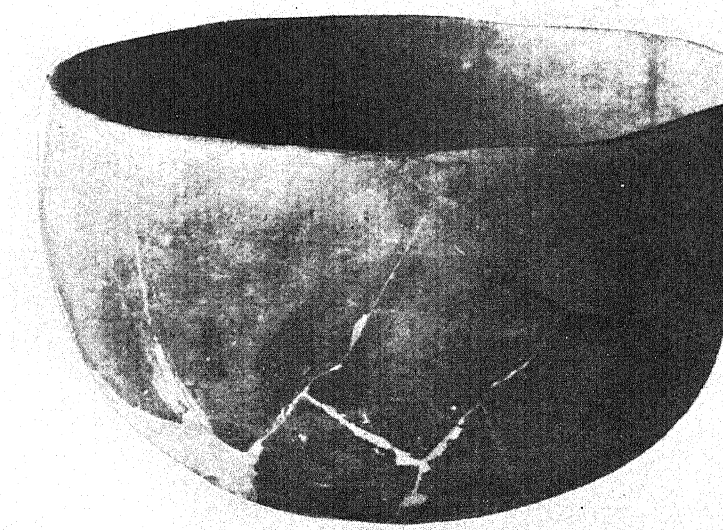
Forms: Hemispherical bowls, globular jars without neck, wide- and narrow-mouthed jars, egg-shaped jars with narrow mouths, and ladles.

Comparison: Alma Rough differs from Alma Plain in the following characteristics: it is unpolished, is tempered with coarser material, is provided with thicker walls, and has no textured variants.

[1] All color references are to "Dictionary of Color" by Maerz and Paul.



B



A

FIG. 89. San Francisco Red, Saliz variety, bowls: *a*, from floor of Pit House E; *b*, from floor of Pit House F. Scale 1:2.

SAN FRANCISCO RED, SALIZ VARIETY

(Formerly called Polished Red)

(Figs. 89–90)

Paste:

Color: Typical color Army Brown (6A10), or a brown with more red in it (6A11). A thin gray core 2 mm. in thickness, changing to brown towards the surface, was found in about one-third of the sherds examined.

Inclusions: Both rounded and angular fragments, generally opaque white in color, but there are also some silvery, lustrous, semi-transparent fragments.

Texture: Granular, moderately tempered with occasional very coarse fragments more than 1 mm. in diameter. Most of the inclusions are smaller.

Fracture: Devious, but the edges are not friable.

Surface features:

Color: Typical color rosy red (5H8, 7H8), ranging through brownish red (6I10).

Hardness: 3.5–4.5 (Moh's scale).

Evenness: Occasional slightly undulating surface, but dimpled surface lacking. Interior surfaces of jars show scraping marks.

Texture: Smooth, polished.

Luster: Medium lustrous.

Slip: A thin layer of clay of different color from the body clay is apparent on examination with a ten-power lens. (Miss Connolly noted slip in her petrographic examination.)

Defects: Abrasion of slip quite frequent.

Thickness of vessel walls: 4 mm. to 9 mm., average 6 mm.

Forms: Globular jar without neck, hemispherical bowls, wide-mouthed jars, and narrow-mouthed jars with oral part drawn out from the body. Lip surfaces rounded, rims direct.

Comparison: The following characteristics of San Francisco Red, Saliz variety, differentiate it from San Francisco Red: lack of finger-dented surfaces, deeper rose color, rarity of marks of polishing tool, coarser paste, less highly polished and less lustrous surface, globular jar, and narrow-mouthed jar forms.

TECHNOLOGY

With the assistance of Dr. Frederick R. Matson, Assistant Curator of Ceramics, University Museums, University of Michigan, Miss Florence Connolly, University of Arizona, and Dr. Sharat K. Roy, Field Museum, some data on the technological aspects of the SU pottery types have been obtained.

Samples of clay, adobe from a burned house, and some sherds were sent to Dr. Matson. His report is as follows:

In order to study the relationship between the clays, adobe and sherds, small briquettes were prepared from each of the four clays and small

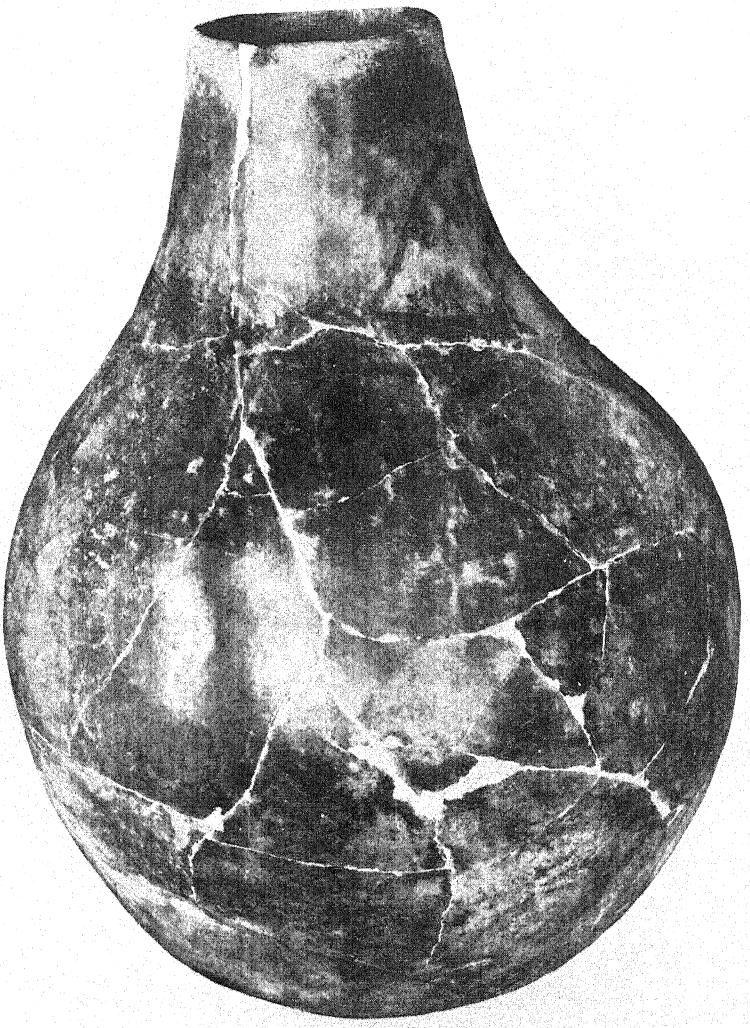


FIG. 90. San Francisco Red, Saliz variety, jar; from floor of Pit House G. Scale 1:3.

test samples were sawed off of one sherd of each of the three types, and of two pieces of adobe that seemed to represent the two varieties present among the samples sent for study.

The briquettes and the sherd and adobe fragments were fired in an electric furnace. A sample of each type was removed after being heated for fifteen minutes at each of the following temperatures: 500°, 600°, 700°, 800°, 900°, and 1000° C.

The colors developed by the four clays were essentially the same. The material from Pit House K was very sandy and difficult to shape into plastic test pieces. When fired it was lighter in color than the other clays, but this is probably due to the presence of so much light-colored sand in the paste. From 500° through 800° there was but slight color change at increasing temperatures, too little to be very significant. Between 800° and 900° the clays became much more orange in color. This effect was still more pronounced between 900° and 1000°. (Colors will not be more specifically described in this report because the test samples are available for examination.) The colors of the adobe samples changed very little from their original state until above 800°. The sherds, too, showed their first marked color change between 800° and 900°.

Since no microscopic thin section study was made of the sherds and clays it would be foolish to make any definite statements concerning their relationship, but on the evidence of the color development and changes upon firing the clays, and refiring the adobe and sherds, it seems likely that they were all made of similar clays and that they were fired below 900° C. A few pieces of adobe have a bright orange color that would indicate a higher temperature in isolated areas during the pit house holocaust.

Forty-five sherds, fifteen of each type (Alma Plain, Alma Rough, and San Francisco Red, Saliz variety), were sent to Miss Connolly for inspection. Six were thin-sectioned and petrographically analyzed. Five of these show the same range of petrographic variation. The sixth showed a slight variation in that megoscopically the surface of the sherd was marred by light scratches and in that petrographically the temper was slightly more angular. The mineral content was the same and the recorded differences do not appear to me to be significant, although Miss Connolly feels that this sherd might have come from some village to the south of the SU site. Miss Connolly's report is herewith presented:

PETROGRAPHIC ANALYSIS OF THIN SECTIONS OF POTTERY

BY FLORENCE CONNOLLY

Since the three pottery types, red, plain and rough, from the SU site show the same range of variation petrographically, the results of their analyses have been combined.

PETROGRAPHIC ANALYSIS OF FIVE THIN SECTIONS OF SAN FRANCISCO RED, ALMA PLAIN, ALMA ROUGH

Index of clay: Ranges from 1.50 to 1.60.

Clay color: Orange-tan to brown with scattered carbon spots.

Clay texture: Even-grained; porosity, fine to medium.

Size of temper: 0.16 to 0.64 mm.; average, 0.32 to 0.48 mm.; a few fragments 0.04 to 0.08 mm., probably belonging to the clay base.

Temper shape: Rounded to subangular, a few definitely angular.

Per cent of surface covered by temper: 30 to 40.

Minerals present:

Per cent range	Per cent average	
25–65	50	Plagioclase; crystals and andesitic or trachytic rock fragments (small lathes in glass ground, flow structure apparent). Some alteration to sericite.
60–20	25	Quartz; both coarse- and fine-grained fragments of vein quartz from a fine sandstone.
5–10	10	Magnetite, showing some alteration to hematite. Some combined with plagioclase in rock fragments.

Trace to 5%.....Biotite
Trace to 5%.....Augite
Trace to 5%.....Opalescent silica
Trace.....Garnet
Trace.....Orthoclase feldspar; some alteration to kaolin

Remarks.—The variety and shape of the tempering materials suggest sand gathered from a stream bed and used in the pottery clay without special preparation.

PETROGRAPHIC ANALYSIS OF ONE (SLIDE NO. 11) ALMA PLAIN, WITH SCRATCHED SURFACE

Index of clay: 1.52.

Clay color: Brown to gray, carbon spots scattered throughout.

Clay texture: Even-grained and finely porous.

Size of temper: 0.16 to 0.80 mm.; average, 0.5 to 0.6 mm.

Temper shape: Subangular to angular.

Per cent of surface covered by temper: 50.

Tempering material: 99 per cent tuff, some showing small plagioclase lathes and magnetite specks with flow structure of volcanic rock apparent in the larger fragments.

Remarks.—The general differences of this slide from other SU slides are immediately apparent—the amount, size, and greater angularity of the temper as well as its homogeneity. A difference in the method of obtaining the temper may be represented by the use of crushed rock as opposed to the use of river sand. However, there is the possibility that the tuff was taken as sand from the head of a stream beginning on a bed of volcanic tuff.

Megascopically the scored sherd is a Mogollon type and probably came from some village to the south of the SU site.

(End of Miss Connolly's Report—ED.)

Although I did not agree with Miss Connolly's feeling that the scratched sherd was essentially different from any other SU pottery, I decided that we must have some more sherds examined petrographically. Therefore, I had ten more thin sections made of other sherds which superficially resembled the scratched one which Miss Connolly thought was "different." (Out of 20,000 sherds, we found only ten with marred or scratched surfaces.) These ten were, megascopically, the most like the sherd in question, and therefore we thought it would be fair to use these to help us decide whether Miss Connolly's guess was right or not.

We examined the sherds first with the aid of a low-powered microscope, using 21× lens. After this examination we concluded that the marks on the surfaces of these sherds were undoubtedly unintentional scratches made when particles of temper were dragged on the surface of the pot when it was being polished before firing. In some instances, one can see where a piece of grit had been dragged out of position and pulled along the soft clay surface, thus causing a short, but unintentional, scratch.

After the ten additional thin sections had been completed, we submitted them, with the six which Miss Connolly had made and reported upon, to Dr. Sharat K. Roy, Curator of Geology at Field Museum. His report is as follows:

> Although my experience with tempered material (pottery) is limited, I was glad to examine these thin sections. The results of my petrographic analyses (mineral content and percentage of minerals) are substantially the same as Miss Connolly's. I think she has made a good and careful examination. I may, however, say that although slide No. 11 (the scratched sherd) is noticeably different (in texture, size, and distribution of its mineral content) from the rest, it is of the same general material (volcanic ash). The observed differences, in my opinion, do not lend themselves to the conclusion that the sherd is of foreign origin; it may just as well have come from the SU site.

In other words, Dr. Roy does not feel that the differences between the "scratched" sherd (No. 11) and the fifteen others are significant or that the sherd in question was necessarily imported from the south, as Miss Connolly suggested.

Thus, from firing and refiring tests and from petrographic analyses it seems likely that the three SU pottery types—Alma Plain, Alma

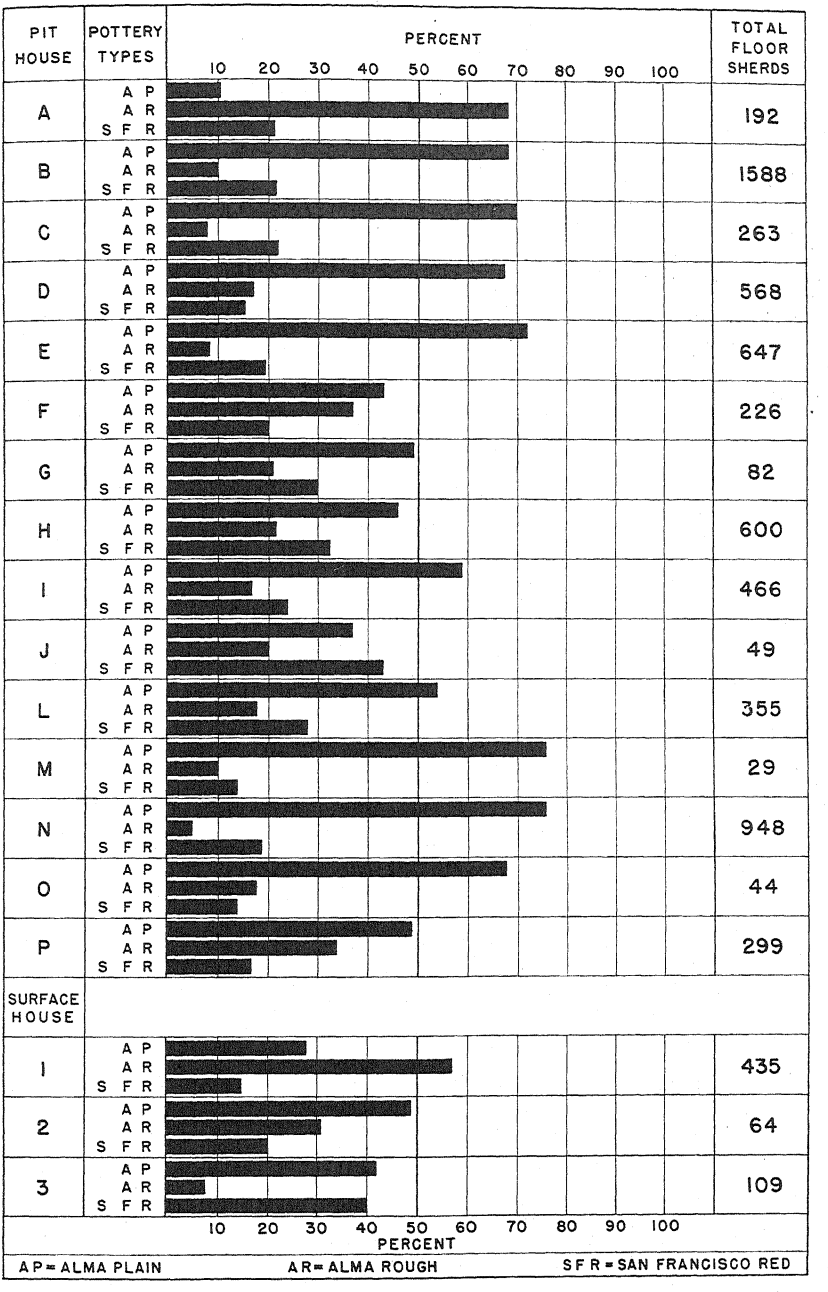


FIG. 91. Graph representing distribution (in percentages) of pottery types found on floors of houses. Chart devised by Don Lehmer; drawn by Robert Yule. Seasons of 1939 and 1941.

Rough, and San Francisco Red, Saliz variety—were made from the same or similar clays and tempering materials, all of which were locally derived.

GENERAL REMARKS

The variation of pottery types from the individual pit houses and from surface houses shows no predominant selection of any one type over either of the other two wares. It is entirely possible, therefore, that pottery was new at the SU site, too new to have a special and most frequently produced ware (see discussion of "favorite" pottery types in Synthesis, pp. 115–134).

No decorated or textured pottery occurred. Several sherds were found with traces of coiling still visible on the inside. Also found was a vessel the side of which had a clean-cut edge from rim to bottom.

EXPLANATIONS OF POTTERY DATA

"Floor" sherds are those sherds which lay directly *on* the floor of the house, and in the first 10 cm. of fill *above* the floor.

"Fill" includes all dirt in a pit house from the surface to within 10 cm. of the floor.

The fill of six pit houses was removed in 20 cm. levels. The sherds from each level were classified and counted by levels. Since no significant variations or differences appeared from this treatment and since the pottery types were consistently only Alma Plain, Alma Rough, and San Francisco Red, Saliz variety, the sherds from all levels were lumped together in these tables under the classification of "fill."

The fill of the pit houses was made up of dark brown dirt containing sherds, some bone and stone implements, traces of charcoal, and numerous rocks, some of which were large. The sherds in the pit houses, as shown by the soil profiles, had been washed in, except in Pit House L. In the latter case, the pit house had been used as a dumping spot.

"Pits." All sherds from the pits within the houses were lumped together under this heading.

Location	Alma Plain No.	Alma Plain %	Alma Rough No.	Alma Rough %	San Francisco Red Saliz Variety No.	San Francisco Red Saliz Variety %	Total Number of Sherds
Trench							
11	96	67	9	6.5	38	26.5	143
17	2	8.5	21	87.5	1	4	24
19	20	39	16	31.5	15	29.5	51
23	104	57	30	16	49	27	183
27 Fill	202	55	60	16	106	29	368
27 Floor	5	6	1	4	78	90	84
27 Total	207	45.5	61	14	184	40.5	452
Total for trenches	429	50	137	16	287	34	853
Stripping							
Environs of H	45	59	8	11	23	30	76
Environs of I	351	48	179	25	199	27	729
Environs of K	242	57.5	98	23	81	19.5	421
Environs of M	81	68.5	13	11	24	20.5	118
Environs of N	301	61	43	8.5	151	30.5	495
Environs of Surface House 2	113	49	47	21	70	30	230
Total for stripping	1,133	55	388	19	548	26	2,069
Pit House H							
Fill	185	33	221	40	148	27	554
Floor	278	46	128	21.5	194	32.5	600
Total	463	40	349	30	342	30	1,154
Pit House I							
Fill	279	40	212	31	202	29	693
Floor	275	59	77	17	114	24	466
Pits	105	81	9	7	15	12	129
Total	659	51	298	23	331	26	1,288
Pit House J							
Fill	495	62.5	99	12.5	198	25	792
Floor	18	37	10	20	21	43	49
Pits	22	69	4	12.5	6	18.5	32
Total	535	61	113	13	225	26	873
Surface House 3 (formerly called "K")							
Fill	1,130	57	362	18.5	487	24.5	1,979
Floor	46	42	9	8	54	50	109
Pits	91	58.5	17	11	47	30.5	155
Total	1,267	56.5	388	17.5	588	26	2,243
Pit House L							
Fill	1,040	47	496	23	658	30	2,194
Floor	191	54	63	18	101	28	355
Total	1,231	48	559	22	759	30	2,549

LOCATION	ALMA PLAIN		ALMA ROUGH		SAN FRANCISCO RED SALIZ VARIETY		TOTAL NUMBER OF SHERDS
	No.	%	No.	%	No.	%	
Pit House M							
Fill	1,035	64.5	184	11.5	389	24	1,608
Floor	22	76	3	10	4	14	29
Total	1,057	64.6	187	11.4	393	24	1,637
Pit House N							
Fill	1,003	73	67	5	295	22	1,365
Floor	718	76	49	5	181	19	948
Total	1,721	74	111	5	476	21	2,308
Pit House O							
Fill	422	52	216	26	177	22	815
Floor	30	68	8	18	6	14	44
Pits	37	63	6	10	16	27	59
Total	489	53.5	230	25	199	21.5	918
Pit House P							
Fill	673	47.5	490	34.5	257	18	1,420
Floor	112	49	79	34	38	17	229
Pits	105	54	41	21	49	25	195
Total	890	48.5	610	33	344	18.5	1,844
Surface House 2							
Fill	794	51	412	27	335	22	1,541
Floor	31	49	20	31	13	20	64
Pits	162	54	71	23	70	23	303
Total	987	52	503	26	418	22	1,908
Total, Pit Houses and Surface Houses	9,299	55.6	3,348	20	4,075	24.4	16,722
Grand totals	10,861	55.3	3,873	19.7	4,910	25	19,644

SUMMARY

1. *Trenches*

Pottery type	No.	%
Alma Plain	429	50
Alma Rough	137	16
San Francisco Red, Saliz variety	287	34
Total	853	100

2. *Stripping*

Pottery type	No.	%
Alma Plain	1,133	55
Alma Rough	388	19
San Francisco Red, Saliz variety	548	26
Total	2,069	100

3. *Pit Houses, all levels*

Pottery type	No.	%
Alma Plain	9,299	55.6
Alma Rough	3,348	20
San Francisco Red, Saliz variety	4,075	24.4
Total	16,722	100

4. *All levels, all houses, pits, stripping, trenches, etc.*

Pottery type	No.	%
Alma Plain	10,861	55.3
Alma Rough	3,873	19.7
San Francisco Red, Saliz variety	4,910	25
Total	19,644[1]	100

[1] Total number of sherds from 1941 dig.

VII. REPORT ON THE SKELETAL MATERIAL

BY

MARJORIE KELLY

Twenty burials were uncovered at the SU site during the summer of 1941. Seven of these were found in the stripping around Pit Houses I and K, and the other thirteen in the houses: two in the refuse above the floor and the rest in pits or sub-pits in the floor. There were very few artifacts found with the burials; several had projectile points or beads with them, and two mortars were found with another burial. Whenever the position of burial was determinable, the body was flexed and generally seated; only one was extended. There was no apparent direction of orientation.

All the skeletons were in a bad state of preservation and in almost all cases the skulls were the only bones brought back to the Museum. Rodents and roots caused considerable posthumous shifting of the bones and this, with the moisture, aided in their destruction. Fourteen skulls were brought to the Museum but they are for the most part fragmentary and badly warped.

As far as can be determined now, the skeletal material from the 1941 expedition is similar to and comparable with the material obtained from the same site in 1939. That is to say: they are pueblоid in type, being brachicranial (with a mean cranial index of 84.5, taken on two skulls), and hypsicranial. Some of the crania exhibit cradleboard deformation.

It is hoped that with further work on the SU site, more and better preserved skeletal material will come to light so that a large series of skulls can be set up and studied. The definite appearance of pueblоid stock at this early site warrants further study of the material.

TABULATION OF DATA

Burial no.	Location	Position	Age	Associated artifacts
27*	Pit House K, sub-pit	Flexed, seated	+45	None
28	Pit House K, sub-pit	?	Infant	None
29*	Pit House K, sub-pit	Flexed, upright	ca. 60	None
30	Pit House I, sub-pit	?	?	None
31	Pit House K, pit	?	+6	Several animal bones
32*	Pit House I, sub-pit	Extended		Bone point, restorable pot
33*	Pit House L, refuse	Flexed, seated	+50	None
34*	Pit House L, refuse	Flexed, seated	50+	Coloring matter; three bone points
35	Pit House K, sub-pit	Flexed, seated	Adult	Pierced shell
36*	Pit House N, pit	Flexed, face down	ca. 60	Two mortars, two shaped stones
37*	Surface Room 2, sub-pit	Flexed, on right side	ca. 50	None
38*	Surface Room 2, sub-pit	Flexed, sitting	ca. 45	None
39*	Surface Room 2, pit	Flexed, on left side	30–40	None
40	Stripping outside Pit House I	?	Infant	None
41*	Stripping outside Pit House I	Flexed, sitting	50+	None
42*	Stripping outside Pit House I	?	ca. 30	None
43*	Stripping outside Pit House I	Tightly flexed, sitting	45–55	None
44*	Stripping outside Pit House K	Flexed, sitting	ca. 26	Crystal projectile point; bead on left arm
45	Stripping outside Pit House K	?	ca. 45–50	None
46*	Stripping outside Pit House K	?	Infant	None

*Skulls brought to Museum.

VIII. AN ARCHAEOLOGICAL SURVEY IN THE VICINITY OF THE SU SITE

BY

BRIGHAM A. ARNOLD[1]

This report is concerned with the results of an archaeological reconnaissance conducted in the vicinity of the SU site during the last two weeks of August, 1941. Fifty-seven sites were located and are herein reported on.

The original plan was to cover intensively an area of some two square miles in this region for the purpose of obtaining a representative cross section of ruins that would serve as a clue to the archaeological situation in the valley as a whole. In its general form this plan was adhered to, and, for the area covered and the number of ruins visited, the results were highly satisfactory. As far as I know, the only other survey in this valley was made in 1931 by Dr. Emil W. Haury and Russell Hastings, both then associated with Gila Pueblo, who in the brief time at their disposal visited the major and more accessible sites in the vicinity.

At the start of the survey it was noted that there are two rather contrasting topographical provinces in the valley and that they might yield significantly different material; accordingly it was decided to obtain collections from a number of ruins typical of each district. In order to accomplish this, an area was selected in each province and all sites of all types and periods in this area were inspected and collected from.

It was found possible and desirable to group most of the sites into three main types on the basis of surface evidence.

Type 1: Surface remains of stone architecture but *lacking pottery* (7).

Type 2: "Sherd areas"—sites from which the greater part of the evidence consists of surface pottery (17).

Type 3: Small pueblos, mostly demolished, with Black-on-White and textured potsherds (18).

The above arrangement represents an apparent chronological order, Type 3 being the latest.

The sites not included in the above types are those that show differences and variations which prevent them from being grouped in any one of these three classes, yet show no significant similarities among themselves. Rather than make other classifications, they

[1] Department of Anthropology, University of Arizona.

have been grouped into one miscellaneous category and are not included in the sherd analysis.

TOPOGRAPHY OF THE VALLEY

The valley itself runs in a general northeasterly-southwesterly direction, rising gradually to the San Francisco Mountains on the northwest and more abruptly to the Saliz Mountains on the southeast. It is approximately seven miles long and three miles wide. The valley is peculiar in possessing a double drainage, the lower part draining to the south, through Saliz and Leggett canyons and their branches into the San Francisco River, and the upper part draining to the northeast into the San Francisco by way of SU and Starkweather canyons and other tributaries. Dividing these two drainage areas is a long, low, slightly rolling ridge, averaging about three-quarters of a mile in width and cutting diagonally across the valley from northwest to southeast.

AREA 1

A part of the more or less level ridge was selected as the first area to be examined and was called Area 1. Near the center of the valley, on this dividing ridge, is a shallow, open basin that would furnish excellent agricultural land. The remainder of the ridge, which rises gradually back to the foothills, is rather heavily timbered, and especially so in the upper regions, with pine, cedar, juniper and live oak.

AREA 2

To the south of this dividing-ridge province, in the upper Leggett Canyon drainage, the topography is considerably different; the surface is broken up by deeper, broader watercourses into a hill and valley province with some level valley bottoms and rolling "hogback" and flat-topped ridges. A portion of this province south of the ridge was selected as the second area to be examined and was called Area 2. This hill and valley province offers arable land in the broader of the flat valley bottoms of Leggett Canyon and the lower parts of its main western tributaries, South Leggett, Oak Springs, and Wet Leggett canyons. The hills are timbered much like the dividing range.

METHOD

The heavily wooded character of most of the country made it extremely difficult to delimit a specific area by artificial borders

such as section lines. Therefore, more obvious boundaries, such as watercourses or roads, were used for the most part.

AREA 1

Within the dividing-ridge province an area (Area 1) was selected which covers approximately three-fourths of a square mile, being limited on the north and east by the highway to Luna, on the south by Dry Leggett Canyon and the southern boundary of Section 13, and extending northwest along the dividing ridge for about a mile and a quarter. The southern portion of this area is invaded by small, shallow washes which drain either into Dry Leggett Canyon or into the central basin. To reconnoiter this unfamiliar area, which has no definite hills and valleys and is timbered so as to limit visibility to a maximum of about fifty yards in any direction, it was decided to follow these shallow watercourses as much as possible. This proved a very adequate solution for the southern third of the area, but the remainder presented a more difficult problem. The northwestern portion is traversed and interlaced by a confusing network of very shallow washes, with very indefinite courses, interspersed between low mounds and ridges, the whole timbered quite heavily. As one continues east the country levels out into a broad, more or less level tract, still heavily wooded. This portion was covered by traversing it back and forth on a compass line; three days were spent in this manner covering only about a third of the remaining area.

AREA 2

Because of the limited time available, the dearth of ruins, and the fact that an excellent cross section of sites in the above district had already been obtained, it was decided to transfer operations to the hill and valley province to the south. In these hills and valleys the actual surveying of Area 2 was comparatively simple. By following first the network of ridges and then the valleys and canyon bottoms, an area of approximately three-quarters of a square mile, extending from Wet Leggett Canyon on the north and east to Oak Springs Canyon on the south and continuing about a mile to the northwest, was surveyed intensively in less than five days.

The fifty-seven sites were located on a photographic enlargement of a portion of the U. S. Geological Survey Topographic Map of the Reserve Quadrangle, Socorro (now Catron) County, New Mexico, 1915. In all, 1,337 sherds were gathered and analyzed. The information on the sites, such as location, environmental conditions,

and material culture, was recorded on separate cards that are filed at Field Museum. In both areas ruins are small, and sherds, for the most part, are sparse and of small size.

SITES IN AREA 1

DISTRIBUTION

In Area 1, in the dividing-ridge province, there is a definite concentration of sites in the southern part on the north bank of Dry Leggett Canyon and along the shallow watercourses previously mentioned. In the remainder of the area examined, ruins are much more infrequent. There is here a definite correlation between topographic conditions and the distribution of sites. Water supply, arable land, and available building material evidently exerted considerable influence on the selection of a site, while the matter of defense was apparently of little or no concern, there being no easily defensible locations in the whole area. The more thickly populated area is that which is close to a water supply rather than that which is nearest to good farming land. However, arable land is available within half a mile of nearly all the sites visited; for example, the large central basin is no more than a mile from the furthest removed of the sites and there are occasional areas in Dry Leggett Canyon itself, especially in the lower part, that would be suitable for small scale agriculture.

CLASSIFICATION

The thirty-seven ruins visited in this area may be classified into three groups, representing types which are differentiated on the basis of surface architectural indications and pottery associations. The groups were termed Types 1, 2, and 3. Seven of the sites showed remains of stone architecture, but few or no sherds; these I have called Type 1. The twelve sites showing no surface indications in the way of stone masonry and generally no painted pottery have been called "sherd area" sites, or Type 2. The Type 3 or "small pueblo" sites are those with Black-on-White and textured potsherds.

TYPE 1

Of the three types of sites recognized in Area 1, by far the most perplexing and interesting were the Type 1 sites—those showing surface remains of stone walls, yet few or no plainware sherds.

Location.—There seems to be no definite concentration of these sites in any particular part of the area, and the choice of a location seems to have been more or less at random.

Indications.—Seven sites of this type were identified; three of them yielded not a single sherd after as much as a half hour's careful search, and from the remaining four a few small plainware pieces, mostly Alma Rough, were collected. As far as surface *architectural* indications are concerned, I can distinguish no difference between these sites and many of the Type 3 sites except that the Type 1 sites are always small, never showing indications of more than three or four rooms.

Site 27.—So confounding was the problem of these sites that one showing no surface sherds whatsoever, Site 27, on the north bank of Dry Leggett Canyon, was partially excavated during the last two days of the season. Before excavation, Site 27 was a small, low mound of rock approximately forty feet long by twenty to twenty-five feet wide. One line of surface rocks, assumed to be a wall foundation, was quite clearly visible; the only other evidence was what appeared to be a room, outlined by fallen wall material. Excavation immediately confirmed the assumption that the line of rocks represented a wall, and further work revealed the remains of a small, stone-walled building consisting of two contiguous rooms separated by an intervening wall. Time was sufficient to excavate the whole interior of the two rooms down to the bottom of the walls, and at the east end work was carried down 0.80 meter into hard, sterile gumbo.

From the whole interior excavation not a single sherd was obtained. A trench along the outside of the west wall yielded two plainware sherds from near the surface. The larger of the two rooms is approximately 4.5 meters square, the smaller about 4.5 by 2.5 meters. The wall remains extend 0.40 to 0.45 meter below the present surface, and from the quantity of fallen wall material present I should estimate the original height to have been not in excess of five feet. The construction is very crude, consisting of unworked stones of various sizes laid up in a rather haphazard manner, with questionable evidence of mud mortar. Material culture of any sort revealed by the interior excavation was extremely scanty; one fragment of a flat slab metate, one hammer stone, and one fragment of a mano (a hand stone) comprise the sum total.

Without further evidence we can only say that the structure is not the result of White occupation and that it is non-pottery or very nearly so. Whether it is pre-pottery or not is questionable; permanent stone masonry architecture would certainly seem out of place in a pre-pottery horizon. This type of site is a puzzle.

TYPE 2

Location.—The Type 2, or sherd area, sites are ordinarily located on rather level, open spaces near the banks of Dry Leggett and the larger of the other watercourses. These portions of the area where the rocky nature of the ground would make any sort of excavation exceedingly difficult were avoided.

Indications.—In these areas the surface indications are confined to sherds and an occasional milling stone. In some cases there are ill-defined but unnatural-looking rises and depressions that probably pertain to sub-surface architectural features, most likely pit houses. Sherds on these sites are extremely scarce, the total from single sites varying from half a dozen to twenty-three, with ten or twelve the usual number. Of the twelve sites of this type in Area 1, four showed nothing but plain ware, three yielded one painted sherd apiece, and on each of the other five were a few fragments of textured ware. Due to the nature of the topography and the location of the sites in this area, it is possible that in some cases the painted and textured sherds did not pertain to the sherd areas on which they were found but were washed in from later sites in the vicinity.

TYPE 3

Location.—The Type 3, or small pueblo, sites are ordinarily located in parts of the area where building material is immediately available. While the majority are situated on or near the bank of Dry Leggett, a number of sites were found back in the more heavily wooded, rocky, northwest portion of the area.

Indications.—These sites vary in size from two or three to as many as a dozen rooms. The walls are invariably demolished, leaving a low mound of unworked stones with a few wall bases visible and occasionally the outline of a whole room. Rooms are contiguous as a rule and in the three or four ruins where mass configuration could be determined the arrangement was in the shape of an L. These sites are generally well overgrown and it is not unusual to find eighteen-inch pines and junipers growing on them. Sherds varied considerably in quantity, but average abundance was much greater than on any of the other types of sites; collections ranged from eighteen to one hundred and sixty-odd sherds. The ceramic complex is almost invariably the same; plain ware is by far the most abundant, with textured and a very few painted sherds.

Site 7.—This site, a typical small pueblo ruin on the north bank of Dry Leggett, possesses a feature unique among the other Type 3

sites visited. There is here a large circular depression about forty feet in diameter and four to five feet in depth at the center, which probably represents a large ceremonial structure or kiva. A part of the east wall has been exposed, revealing a very crude stone masonry of large unworked blocks laid up apparently without mortar or spalling of any sort. There are only six or eight rooms in the pueblo itself, which is not connected with this kiva. Considering the small size of this pueblo and the fact that the kiva is the only one of its sort in the vicinity, it probably fulfilled the requirements of the whole area as far as ceremonial activities of that period were concerned.

SITES IN AREA 2

DISTRIBUTION

In Area 2, in the hill and valley province to the south of Area 1, the sites are nearly all located on the more or less flattened lower portions of the ridges with the concentration along the southwest side of Wet Leggett Canyon. In the interior of the area, ruins are absent. There is again a definite correlation between the topography of the area and the location of the sites. Of twenty ruins visited, all but two were located on the ridges.

In this case, it might seem that were nearness to water supply the deciding factor in the location of a building site, the majority of ruins would have been down in the valley bottoms. Since they are not, but are up on the hills overlooking the valleys, some logical assumptions would be that a more easily defensible position was chosen, that the valleys were used for agriculture, or that the climatic conditions were such that the valleys were subject to periodic flooding in early times and therefore a hill location was more desirable. Now nearly all of the ruins in Area 2 are classifiable as Types 2 and 3 (sherd areas and small pueblos) and are roughly contemporaneous with those types in Area 1. Since none of those sites in Area 1 are in an easily defensible location, I think we can eliminate safety from attackers as the prime mover in selection of a site in Area 2 as well as in Area 1. Availability of arable land may easily have exerted considerable influence; there is no conclusive evidence that it did not. Of course, in regard to the small pueblo sites, the availability of building material doubtless had much to do with the selection of a site.

CLASSIFICATION

The same general types of sites occur in Area 2 as in Area 1, except that there are no Type 1 sites (surface remains of stone

walls, but no pottery) in Area 2. The greater number of sites in Area 1—nearly twice as many as in Area 2—is doubtless due to the topographic differences of the two provinces; nearly all of the interior region of Area 2 is unsuitable for the location of a site of any sort, being made up entirely of rolling "hogback" ridges. There are proportionately more sherd area sites and less small pueblo sites in Area 2, which adds support to the hypothesis that the people who lived in the small pueblo ruins were not primarily concerned with defense; if they had been, the greatest concentration would have been in the hill and valley country, where building sites are as numerous and much more advantageous from a safety standpoint than in the dividing-ridge province.

Type 1.—No Type 1 sites were noted in Area 2. However, one site differing from all others was visited. This site, No. 46, is an area on a ridge where no sherds occur but where worked stone is present in considerable abundance; on this site a number of chips, a few cores, and two points were collected. Whether this worked stone pertains to a sub-surface occupation is questionable, since a very similar area near the SU site was partially tested and showed no evidence of chipped stone beneath the surface layer.

Type 2.—The Type 2 (sherd area) sites of Area 2 are similar to those of Area 1 with the exception that on none of the seven visited were there any textured or painted sherds; this condition, coupled with the fact that the topographic conditions and grouping of sites in the dividing-ridge province offers a much greater chance for displacement of sherds than in the hills and valleys, would add weight to the suggestion that on at least some of the sherd-area sites in Area 1 where other than plain ware sherds occurred, they were intrusive elements probably later in time than the sites on which they were found. There is also an argument for the Type 2 sites in Area 2 being slightly earlier than those in the first area in that the relative quantity of Alma Rough to Alma Plain was greater on the average in those of Area 2.

Type 3.—Four Type 3 sites (small pueblos) were visited in Area 2, and two more were surveyed near the road immediately to the south of the area. These six sites are in nearly all essentials, including sherd analysis, the same as those of Area 1. One difference may be noted; on only one of the small pueblo sites in Area 1 was there a circular depression, that being the large kiva of site 7; in Area 2 and vicinity, small circular depressions varying from ten to twenty feet in diameter are found in all but two of the Type 3 sites. The

significance of this difference is not clear; apparently the depressions represent sub-surface architectural features of some sort, but whether contemporaneous with the surface rooms in all cases is open to question.

SHERD ANALYSIS AND CHRONOLOGY

PAINTED AND TEXTURED WARES

The textured and painted wares (272 sherds) from all sites were examined by Dr. Emil W. Haury and Dr. Paul S. Martin. The great majority of the sherds were very small and weather-worn, with many of the Black-on-White pieces showing no decorative elements, so that exact identification would be uncertain at best. Of the textured wares, many characteristic Mimbres features such as a line of indentations between the corrugated and plain surfaces, incising over the corrugations, tool marking of various sorts, etc. The bulk of this material can be placed in a Pueblo II time level. There are a few sherds of broad-banded ware which are close to Alma Neck Banded and probably representative of the earlier San Francisco phase, and some Classic Mimbres corrugated. Because of size and weathering, more than one-third of the Black-on-White sherds could not be identified. Of the remainder the greater share was ex-Mimbres, that is, closely akin to the Mimbres Bold Face–Mimbres Classic sequence; a few pieces were identified as Mimbres Bold Face. There were a number of sherds showing a fine, hard paste and finish characteristic of the North and nearest to Wingate Black-on-White of late Pueblo II and early Pueblo III times. Earlier wares were represented by one sherd each of White Mound Black-on-White and Lino Gray.

Type 2 Sites (Sherd Areas).—Only generalizations could be made concerning the few textured and painted pieces from Type 2 sites of Area 1. One of the painted sherds was probably of Mimbres affiliations and the other two were so small as to be unidentifiable. On three of the sites showing textured pottery, these few sherds were either a broad-banded ware close to Alma Neck Banded, or Alma Incised or Scored; the remaining two sites produced a few sherds typical of Mimbres corrugated of a time level corresponding to Pueblo II.

PLAIN WARES

The bulk of the sherds from all sites was Mogollon plain ware, which could be divided into the two classes: Alma Plain and Alma Rough. A significant distinction was noted with respect to the

relative abundance of these two classes in the Type 2 and Type 3 sites.

Type 2 Sites (Sherd Areas).—Considering those sites in both areas on which plain ware only was found, the percentage of Alma Rough to total plain ware averaged more than 54 per cent, or nearly twice the percentage in the Type 3 sites. Among the Type 2 sites on which other than plain ware was found, the plain varied from 45 per cent to 100 per cent Alma Rough.

Type 3 Sites.—On these sites, in both areas, an average of less than one-third of the plain ware was Alma Rough. This contrasts markedly with the material from the Type 2 sites.

CHRONOLOGY

In a survey of this sort the only evidence of time differences between the sites must come from typological similarities and differences, and mainly from comparison of pottery types with those of excavated ruins in the vicinity. There would be no point in a lengthy argument here on the possible antiquity of the Type 1 sites (surface remains of stone walls, no pottery); typologically these would precede anything in the vicinity. The Type 2 sites (sherd areas) which show no textured or painted pottery resemble the SU site so closely (before excavation) that I think the majority can be assigned to the same period—the Pine Lawn phase. If we assume that the textured and painted wares found on some sherd areas do pertain to those sites, they would seem to fall in Georgetown or San Francisco phases. The chronological affinities of the Type 3 sites (small pueblos), on the basis of surface features and the presence of pottery akin to Anasazi Pueblo II and III sherds and Mimbres Bold Face, and Classic Black-on-White, are closest to Haury's Three Circle and Nesbitt's Upper Gila phases.

A rather perplexing problem is presented by the complete absence, in the area covered, of any sites yielding the older Mogollon painted wares; in the whole survey not a single sherd of Red-on-Brown or Three Circle Red-on-White was collected. In other words, there was nothing to parallel the ceramic complex of the pit house villages at Mogollon 1:15 to the south, excavated by Haury, and Starkweather ruin to the north, excavated by Nesbitt. Although Mogollon Red-on-Brown occurred in only minor quantities at the above ruins and Three Circle Red-on-White did not occur at Mogollon 1:15, the fact that a careful examination of all sites in this survey yielded not a single sherd seems significant. To attempt any explanation

of this lack, in view of the relatively small areas covered by the survey, would be unwise at this time. It is possible that the areas selected were not representative of the valley and that a complete survey of the region would result in the discovery of sites yielding early Mogollon painted wares, or that sherds of those types were present in such small quantities as not to appear on the surface. At best it is a problem the solution of which should await further work.

SUMMARY

This survey covered intensively an area of about one and one-half square miles in two sections representative of the two topographical districts in the region—the more or less level dividing-ridge province and the hill-and-valley province. Fifty-seven sites were located and 1,337 sherds were gathered and analyzed.

The same general types of sites occurred in both areas with one exception—there were no Type 1 sites (surface remains of stone architecture, but no pottery) in Area 2, in the hill-and-valley province. The three types of sites recognized in the survey are given in their apparent chronological order as follows: Type 1, showing stone-walled rooms with little or no pottery; Type 2, sherd areas with no surface architectural features and generally only plain ware sherds; Type 3, small pueblo sites with textured and painted pottery. Due to the unique combination of stone masonry and no pottery, the chronological position of the Type 1 sites is uncertain; considering the lack of pottery and other factors they are apparently early.

The probable relation of the sites to specific periods in the Mogollon and Anasazi chronologies is as follows:

Type	Mogollon (phases)	Anasazi
1	?	?
2	*Pine Lawn*	Pre-A.D. 500
	Georgetown(?) / San Francisco(?)	PI
3	Three Circle (Haury) or Upper Gila (Nesbitt)	PII to early PIII

There is a definite correlation between topographic conditions and the location of the sites; the selection of a building spot apparently hinged on nearness to water supply, arable land, and available building material, with water probably most important in the earlier periods. The consideration of defense was apparently never of great concern.

There was noted a very marked decrease in the relative abundance of Alma Rough from early to late times.

No Mogollon Red-on-Brown or Three Circle Red-on-White was found in the areas covered.

From the results of this survey, it is apparent that there are a number of sites in the areas covered which should repay excavation. Probably the most outstanding are the Type 1 sites—those stone-walled habitations which show little or no pottery; these sites are small and a few weeks spent in excavation would doubtless solve their problem. In addition there are two small pueblo sites in particular which present excellent chances of stratigraphy. On Type 3 sites (number 35 in Area 1 and number 49 in Area 2), sherds of pre-A.D. 750 wares were found—one White Mound Black-on-White and one Lino Gray. Both of these sites offer evidence in the way of location and surface features which indicates that the later small pueblos may be superimposed on earlier pit house ruins. On site 49 a small depression is apparent which may represent an earlier sub-surface residence.

CONCLUSION

This survey is recognized as being incomplete and it is hoped that an intensive reconnaissance of the whole valley may be undertaken in the near future. There exists in this particular valley a most unusual opportunity for a program of combined survey and excavation. The area seems to be near the line of contact between the Mogollon and Anasazi cultures and offers an excellent chance of a long chronological sequence with probable superposition of phases in a number of instances. In addition, the great majority of the sites are small and a number of different ruins representative of each phase could be excavated in a relatively short period, an undertaking which would be vastly more profitable than the excavation of one large site.

With a complete survey of the area, supplemented by proper excavation, the whole cultural sequence in this valley would rest in the palm of one's hand.

SHERD ANALYSIS WITH RESPECT TO SITE TYPES AND PHASES

PHASES	SITE NUMBERS	PLAIN			TEXTURED			BLACK-ON-WHITE				UNIDENTIFIED	TOTAL SHERDS
		Alma Rough	Alma Plain	San Francisco Red	Broad-Banded	Ex-Mimbres	Classic Mimbres	Mimbres	Bold Face Ex-Mimbres	Ex-Anasazi (PII–PIII)	Other		
Type 3: Small pueblo sites Three Circle and Upper Gila phases	1	25	82	3		27	2		1				140
	2	10	29			4	2			1			46
	5	24	39	1	2	7			1	2		10	86
	7	44	73	2	2	26	1		5	5		4	162
	10	21	34	1	2	12		1	3		1 Fstdl. Valley PI		75
	12	14	18		1	4	1	1				1	40
	20	1	11		1	4		1					18
	23	12	13		2	6		1	1			1	36
	28	12	16	1	1	10	1		1			3	45
	29	18	61	1	3	8		2	6	2		2	103
	35	6	30			4			4		1 Lino Gray	3	48
	37	4	31	1		10	1			1		2	50
	39	11	18			11	1		1			6	48
	40	21	23			3	2		1			1	51
	48	9	14	2									25
	49	12	41			5			1	1	1 White Mound	2	63
	56	7	26	2		3			3	2			43
	57	6	10		1				2			2	21

SHERD ANALYSIS WITH RESPECT TO SITE TYPES AND PHASES—*Continued*

Phases	Site Numbers	Plain			Textured			Black-on-White				Unidentified	Total Sherds
		Alma Rough	Alma Plain	San Francisco Red	Broad-Banded	Ex-Mimbres	Classic Mimbres	Mimbres	Bold Face Ex-Mimbres	Ex-Anasazi (PII–PIII)	Other		
Type 2: Sherd-Area sites — Prob. Ggtwn. & S. F. phases	13	3	3									1	7
	14	14	8									1	23
	15	15	4		3								22
	17	7	8								1 close to Three Circle		16
	19	2	3			1							6
	21	7	4		1								12
	22	2	1			2							5
	45	10	13		2								25
Type 2: Sherd-Area sites — Pine Lawn phase	4	11	5										16
	6	6	7										13
	16	5		1									6
	25	3		3									6
	42	9	1										10
	43	9	3										12
	50	2	2										4
	53	12	5										17
	54	8	5										13
Type 1: Stone-walled structures, no pottery	11												None
	18												None
	24	5	1										6
	26		4										4
	27												None
	30	5	1										6
	31	5	3										8
Total		397	653	15	21	147	11	6	30	14	4	39	1337

BIBLIOGRAPHY

BRAND, D. D., HAWLEY, F. M., HIBBEN, F. C., ET AL.

1937. Tseh So, a small house ruin, Chaco Canyon, New Mexico. University of New Mexico, Anthropological Series, vol. 2, No. 2. Albuquerque, New Mexico.

GLADWIN, H. S.

1942. Excavations at Snaketown, III. Gila Pueblo, Medallion Papers, No. 30. Globe, Arizona.

GUERNSEY, S. J.

1931. Explorations in northeastern Arizona. Report on the archaeological fieldwork of 1920–1923. Papers, Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. 12, No. 1. Cambridge, Massachusetts.

HAURY, E. W.

1931. Minute beads from prehistoric pueblos. American Anthropologist, vol. 33, pp. 80–87. Menasha, Wisconsin.

1936a. The Mogollon culture of southwestern New Mexico. Gila Pueblo, Medallion Papers, No. 20. Globe, Arizona.

1936b. Some southwestern pottery types. Series 4. Gila Pueblo, Medallion Papers, No. 19. Globe, Arizona.

1941. Excavations in the Forestdale Valley, east-central Arizona. University of Arizona Bulletin, vol. 11, No. 4 (Social Science Bulletin No. 12). Tucson, Arizona.

KIDDER, A. V.

1924. An introduction to the study of southwestern archaeology. Papers of the Phillips Academy Southwestern Expedition, No. 1. New Haven, Connecticut.

——, and GUERNSEY, S. J.

1919. Archaeological explorations in northeastern Arizona. Bureau of American Ethnology, Bulletin 65. Washington, D.C.

KROEBER, A. L.

1928. Native culture of the southwest. University of California Publications in American Archaeology and Ethnology, vol. 23, No. 9, pp. 375–398. Berkeley, California.

MAERZ, A. and PAUL, M. R.

1930. A dictionary of color. New York.

MARTIN, P. S.

1940. The SU site, excavations at a Mogollon village, western New Mexico, 1939. Field Museum of Natural History, Anthropological Series, vol. 32, No. 1. Chicago.

——, LLOYD, CARL, and SPOEHR, ALEXANDER

1938. Archaeological work in the Ackmen–Lowry area, southwestern Colorado, 1937. Field Museum of Natural History, Anthropological Series, vol. 23, No. 2. Chicago.

——, and RINALDO, JOHN

1939. Modified Basket Maker sites, Ackmen–Lowry area, southwestern Colorado, 1938. Field Museum of Natural History, Anthropological Series, vol. 23, No. 3. Chicago.

MORRIS, E. H.
1936. Archaeological background of dates in early Arizona chronology. Tree-Ring Bulletin, vol. 2, No. 4, April, 1936. Tucson, Arizona.
1939. Archaeological studies in the La Plata district, southwestern Colorado and northwestern New Mexico. Carnegie Institution of Washington, Publication No. 519. Washington, D.C.

NESBITT, P. H.
1938. Starkweather ruin. Logan Museum Publications in Anthropology, Bulletin No. 6. Beloit, Wisconsin.

RINALDO, JOHN
1941. Conjectures on the independent development of the Mogollon culture. American Antiquity, vol. 7, No. 1.

ROBERTS, F. H. H., JR.
1929. Shabik'eschee Village: a late Basket Maker site in the Chaco Canyon, New Mexico. Bureau of American Ethnology, Bulletin 92. Washington, D.C.
1930. Early Pueblo ruins in the Piedra District, southwestern Colorado. Bureau of American Ethnology, Bulletin 96. Washington, D.C.
1931. Ruins at Kiatuthlanna, eastern Arizona. Bureau of American Ethnology, Bulletin 100. Washington, D.C.
1940. Archaeological remains in the Whitewater District, eastern Arizona. Part II: Artifacts and Burials. Bureau of American Ethnology, Bulletin 126. Washington, D.C.

SAYLES, E. B. and ANTEVS, ERNST
1941. The Cochise culture. Gila Pueblo, Medallion Papers, No. 29. Globe, Arizona.

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